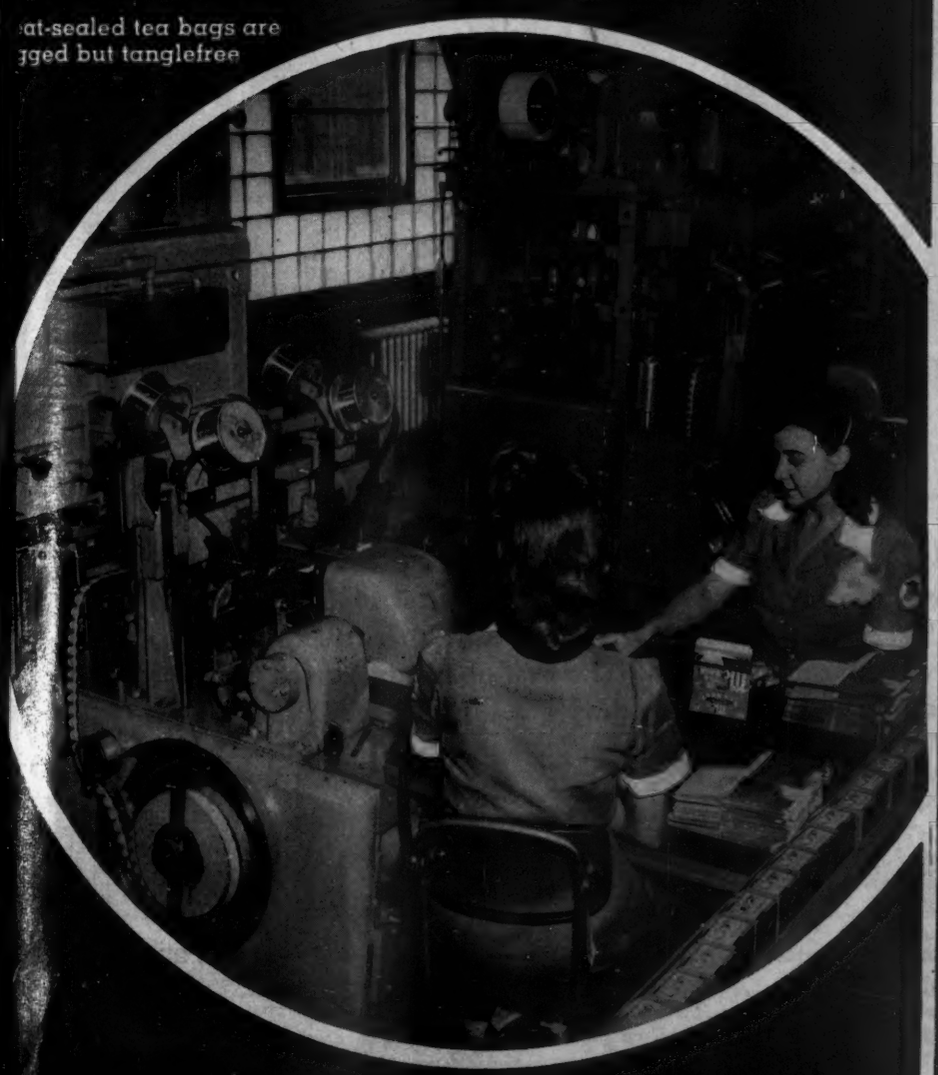
ENGINEERING

JAN 2 1948

FOOD INDUSTRIES

NATIONAL EDITION

● FOR THOSE WHO CONTROL QUALITY HROUGH MANAGEMENT AND PRODUCTION



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JANUARY 1948

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Bottlers Stress Public Relations

Automatic Control Of Sewage Pumps

Bone Darkening In Frozen Chickens

Setting Up a Plant Cleaning Program

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FOOD INDUSTRIES

FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION

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THE COVER

HEAT SEALING machines, at McCormick & Co., pack double lines of 150 tea bags a minute. Filter paper for bags is fed from two rolls; tags are fed from lower left and string from spool at left. Wire to attach string and tag, which are wrapped around bag, comes from spools below switch. Pneumatic Scale Corp. is the manufacturer.

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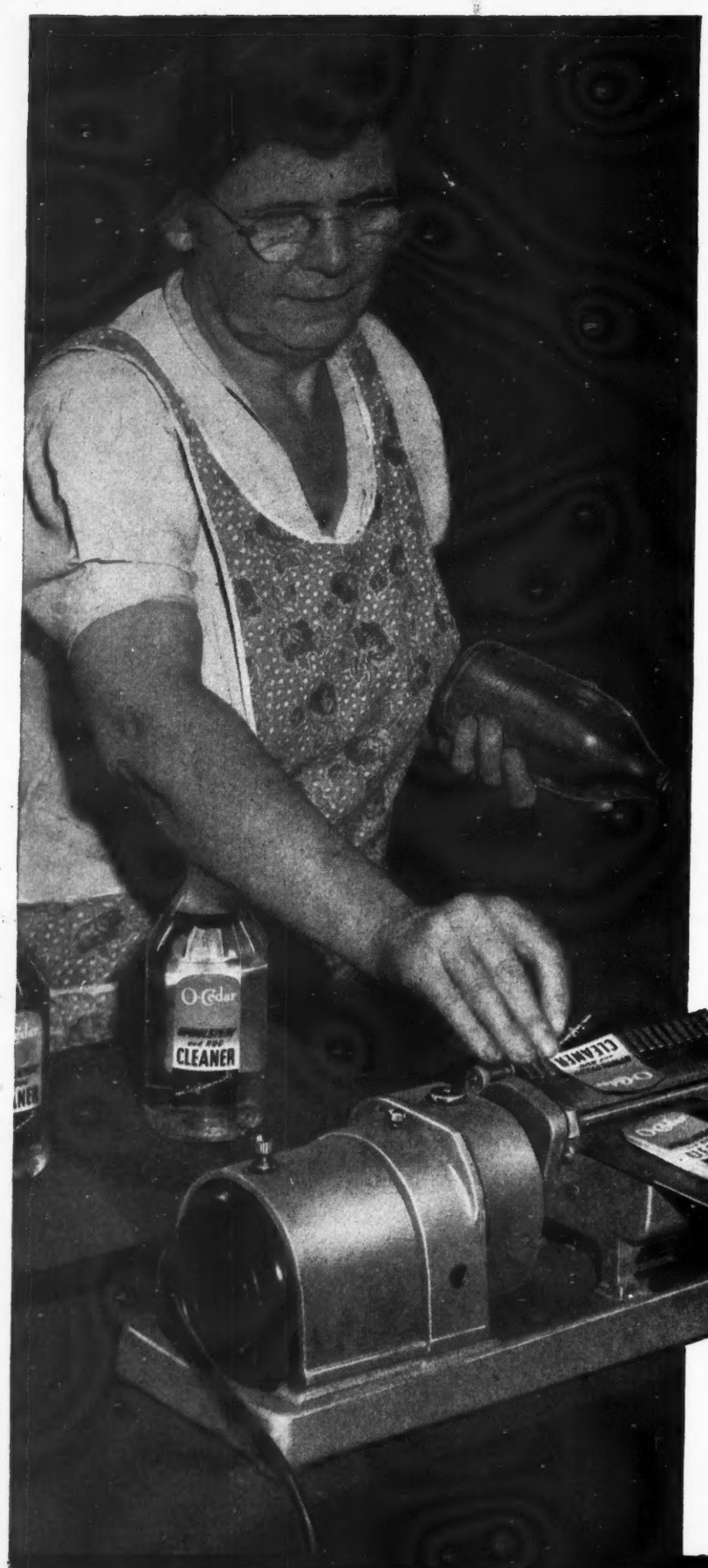

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"The fate of the world sits on this rug"

– JOHN L. LEWIS

NOTE: Paste this editorial in your hat. Re-read it as you start to shiver the next time John L. Lewis cuts off the nation's coal supply.

"Labor monopoly" will mean much more to you then. But if you are worried enough you will get after your Congressman to do his part now — before the shivering starts.

★ ★ ★

"The fate of the world sits on this rug."

The men on the rug: John L. Lewis, President of the United Mine Workers, who made the remark; Benjamin Fairless, President, United States Steel Corporation; George M. Humphrey, Chairman, Pittsburgh Consolidation Coal Company; Harry M. Moses, President, H. C. Frick Coke Company; Charles O'Neill, President, United Eastern Coal Sales Corporation; the late John O'Leary, International Vice President of the United Mine Workers; and John Owens, President, District No. 6 United Mine Workers.

The place: Room 800, Carlton Hotel, Washington, D. C.

The time: Last July during the "negotiation" of a new soft coal contract.

The outcome: Another whopping increase in wages and the price of coal, another hike in the cost of living, and a "contract" which binds the United Mine Workers only as long as they are "willing and able to work."

Mr. Lewis was right. The fate of the world did sit on the rug. In fact, it sat at Mr. Lewis' feet, for, as this editorial will explain and as the outcome shows, his power over coal is absolute.

Without coal modern industrial civilization collapses. Without Mr. Lewis' assent coal can not be mined. He has the nation and, in the years 1947-48, the world at his mercy.

The Taft-Hartley Act, good as it is, does nothing to check this kind of monopoly.

I

The Taft-Hartley Act fails to protect the public in many major particulars.

Here are some of them.

1. Labor monopoly is promoted and protected by its continued exemption from the federal antitrust laws. Management has no such exemption and should not have.

2. Industry-wide bargaining, a kind of second-degree monopoly, is left virtually undisturbed. So is union-wide bargaining which extends the power of national unions far beyond a single industry.

3. Featherbedding, the art of getting paid for doing nothing, is left largely intact.

4. The menace of having local utility strikes wreck the health and safety of a community is left untouched. Postponement and persuasion are the only instruments provided to deal with strikes that would wreck the nation.

My purpose in citing these omissions from the Taft-Hartley Act is not to belittle the act or its framers. They did a most courageous and constructive job. They made a real start toward restoring a workable balance in industrial relations in the United States, so far as the law can do it. But they have not completed the job. Among their omissions the two discussed in the next sections of this editorial stand out above all others.

II

The most serious Taft-Hartley shortcoming is its failure to deal with labor monopoly.

Labor monopoly exists wherever a union is so strong that bargaining becomes a sham and the union virtually dictates its own terms.

If an employer or group of employers secures a monopoly or anything approaching a monopoly, prosecution for violation of the federal antitrust laws

is in order. That is as it should be, for monopoly means death to economic and political freedom.

But if a labor union secures complete monopoly control over an industry through control of its workers, that union remains above and beyond the antitrust laws. "The fate of the world sits on this rug." By that imperial attitude John L. Lewis fully demonstrated how obsolete is the notion that labor unions are weak and, therefore, need exemption from the antitrust laws. Through the United Mine Workers, Mr. Lewis controls about 90% of the coal miners. (No company controls more than 5% of the nation's coal output.) Wherever he sits he has at his feet the welfare of the whole nation.

Great international unions exercise a comparable measure of monopoly control in other basic industries—steel, transportation, and automobiles, for example.

These labor monopolies can destroy the nation if they are not themselves broken up. Witness the plight of France. There the Communists have found in the great labor monopolies an instrument for shaking the nation to its foundations.

III

The Taft-Hartley Act also leaves untouched industry-wide collective bargaining, which is a kind of second-degree monopoly.

When all or almost all of the employers in an industry get together with the union leaders to agree on wages and working conditions (that is called industry-wide bargaining) they set up a monopoly control. It is a less concentrated monopoly than when the terms are dictated by either side, as Lewis dictates them in coal. But, nonetheless, competition is eliminated and monopoly control is established over wages, which are by far the largest element in the cost of production. It follows that public regulation of collective bargaining—*which means the end of free unions and free management*—is not far behind.

Some employers defend industry-wide bargaining as their only defense against industry-wide unions. Other employers like it because it makes wages and hours uniform for their whole industry.

For those employers who are forced into industry-wide bargaining in self-defense the road to relief is clear. Congress owes it to them and to the public to free them from the necessity of dealing with a monopolistic union. The best way to do that is to remove the exemption of labor unions from the federal antitrust laws.

To those employers who engage in industry-wide bargaining because they like it the proper answer is also quite clear. They (and the union involved) are maintaining a private monopoly which is offensive to the public interest. It should be prevented by law.

IV

Congress should finish the job of eliminating labor monopoly and industry-wide bargaining.

In the course of enacting the Taft-Hartley law last spring the House acted to eliminate the exemption of unions from the federal antitrust laws and to make industry-wide bargaining illegal. The Senate, however, refused to go along.

The principal reason advanced in the Senate for deferring action was that more knowledge is required to legislate intelligently. To get the needed information, a joint Congressional committee was created.

It is standard Congressional practice to stall off tackling a difficult job by creating a special committee to study it. The new joint committee is not likely to prove an exception to this rule—*unless the voters loudly demand of Congress that it get on with its job of protecting the public interest in the conduct of labor relations—a job which is nowhere near done.*

Helpful and effective as many of its provisions are, the Taft-Hartley Act does not face squarely the central principle of industrial relations in a free society. That principle is this: *Neither employers nor organized workers, separately or in combination, shall exploit the public by establishing a monopoly.*

Do not let your Congressmen go to sleep on the job of solving that problem or hide from it because of fear. The perfect solution may be hard to find. But the problem can be largely solved by making organized labor subject to the federal antitrust laws just as management is now subject to them. If that problem goes by default your children and your grandchildren will really know what slave labor means.

President, McGraw-Hill Publishing Company, Inc.

Outlook for 1948

EARLY last November the 1948 prospects for the food processing industry were fairly discernible. At that time the Marshall Plan for European Relief was the major factor to be reckoned. But by December, the tariff reduction plan and President Truman's 10-point program also entered the picture to forecast a disquieting year.

Prior to those latter events the problem of evaluating the future was largely one of computing the change in production volume of processed foods under the assumption that aid to Europe would operate under an implemented Marshall Plan with a free play of prices. While tariff reductions and inflation control may be made effective in 1948, their influence on the probable volume of production of processed foods may be small. Yet their impact on consumer spending and food prices must be considered.

The coming year will resemble a war economy minus the production of munitions of physical combat. We are engaging in an ideological war to prevent the spread of totalitarianism throughout the world. The weapons today will be mainly unprocessed food, fuel, metals and good will.

We Live on the Residue

Principal food exports will be unprocessed grains, with fats and oils, sugar, small quantities of meat or other high protein foods to a much less extent. Aside from purely technological reasons for exporting food as grain, its low cost per 1,000 calories to U. S. taxpayers is not to be disdained in a program costing us many billions of dollars.

For those who must plan their 1948-49 operations, the indirect effect of these European exports on the quantities of foods available for processing for the domestic market is a basic consideration.

We must not, however, fall into the error of thinking that people are the only consumers of food stuffs. Animals consumed about 4.4 times the quantity of grains consumed by the American people in 1946-47. So the effort will be to curtail both human and animal consumption. Secretary Anderson predicts as a result, the per capita consumption of meat in 1948 will drop from 146 to 135 lb., and that the available supply from February to June will be "distressingly short." At last the administration is imposing reduced consumption incentives where they will be most effective. But milk production cannot be kept up the year around with reduced animal numbers and feed supplies. Hence a continuation of existing orders on certain milk sheds to sell about 90 percent as fluid and manufacture only 10 percent seems likely.

Vegetables to Take up Slack

The trend is definitely toward an agrarian or direct consumption policy for 1948. To supplement the domestic food supply remaining after exports, it is likely that fruit and vegetable consumption will be increased. Fruit production is relatively inelastic and slow to change. The emphasis will be on vegetables; the production of which can be varied at will — within the limits imposed by available acreage, weather, use of fertilizer and seed supply.

In calculating the future trend in vegetable processing it is well to keep in mind that tin and sheet steel, already in short supply, will be still shorter under the Marshall Plan. Yet cans must be made available or the domestic food supply may be impaired. U. S. Department of Commerce, foreseeing this possibility, is taking steps to remedy the situation by influencing the packaging of coffee away from tin cans to glass jars, paper bags and black plate cans. The beer can may be temporarily discontinued. Fortunately the glass container industry has about 15 percent of unused capacity at the present time.

Freezing preservation looms large in the 1948 picture, but the extent to which it will be able to meet the need to supplement our domestic food supply will depend considerably on the availability of unoccupied freezer warehouse space when it is needed. This, in turn, will depend on the rate of disappearance of 1946-47 production which, up to now, has not been at a satisfactory rate.

Summary

The coming year will be one of shifting raw material supply, high unit manufacturing costs (that can be reduced by suitable mechanization), increased volume for certain branches of the industry and reduced volumes for others. Price-wise, the future depends on Congressional action relative to the 10 Truman proposals and on the indirect effect on consumer buying power in certain markets where tariff reduction may exert a notable effect.

CONSULTING EDITOR

The Talk of the Industry

• IT sounds as if the wheat saving campaign were beginning to be effective. Wheatena Co. advertises to housewives to take a top from Wheatena box to their grocer and buy a pound of coffee for 15 cents off the regular price.

• DR. CLIVE M. MCCAY of Cornell University is depriving the uninformed faddist of one of his favorite delusions by discovering a dental virtue in rhubarb. A faddist, bless her heart, once confided to us that she never would serve rhubarb to her family—"contains oxalic acid—you know people commit suicide with oxalic acid." Now Dr. McCay finds that rhubarb's oxalic acid protects the teeth from the effects of acids of carbonated beverages. Wonder if the beverage makers will be any happier?

• THE army sent more than 11,000 tons of potatoes to troops in Germany in September. Of the four shiploads arriving at Bremerhaven, 4,075 tons were rotten, which is a 36-percent loss. Only 5,518 tons could be shipped further or stored, while another 1,830 tons were, by courtesy, said to be edible. The general idea seems to be that something went amiss somewhere. But the experience should give pause to those who advocate shipping unpreserved perishables to Europe. It took 700 men many days to overhaul and sort this vast quantity of spoiled food.

• U. S. DEPARTMENT OF AGRICULTURE release No. 1987-47-2 tells us how research has made possible the domestic production of about 10,000,000 lb. of casein textile fiber a year. The release does not tell, however, that research has not yet discovered an adequate outlet for the equivalent amounts of lactose (milk sugar) in the milk.

It's an unhappy fact that the current market price for lactose is way below its cost of production; and though casein is selling very well just now, its price is not high enough to compensate for the losses on lactose. So a lot of casein plants are shut down and the skim is going to the hogs—all because there is not a good market for lactose.

• MANY a food company has thought to play smart and escape city taxes by locating a new plant just outside the city limits. It seldom works. Usually the city extends its city limits to take in the new plant. After which it pays city taxes, yet suffers all the inconvenience of a remote location.

If you are tempted to try to beat this form of taxation, either get so far away that your property can't be touched, or else select the plant site for convenience and economy, and forget the taxes. We have seen many firms waste much more money than they would save on taxation by such futile efforts to evade the municipal tax collector.

• CONSIDER the case of the State of New York which is, believe it or not, a bottler of table and laxative waters at famous Saratoga Springs. The Saratoga Springs Authority has been forced to raise the price of a 24/15-oz. case of bottled water from $3.25 to $3.75, at the same time requiring a 75 cent deposit. One may assume that the raw material cost has not changed—or was it the autumn drought?

Funny thing about water. Back in the Unhappy Thirties, the president of a large subsidiary of a dairy company almost lost his job because he proposed distributing bottled waters at 17½ cents a quart on route trucks when milk was selling at 12 cents. Although the water would fetch much higher prices than milk in small quantities the farmer relations aspect was so bad the idea was summarily dismissed.

• TREE breeding is a slow process, but Dr. J. W. Martin of University of Vermont has developed a new strain of sugar maple that now is being multiplied in a nursery. The new tree will yield more and sweeter maple sap. Years will, of course, elapse before the effects of his research will be felt in the maple sugar trade.

Long range projects of this sort are needed more and more. Many a time we wish our ancestors had been a little more considerate of their posterity.

• RISING cost of food is forcing hospitals to review their feeding methods. With costs up 20 percent, something must be done. May we suggest that the high cost of hospital feeding lies, not in the food consumed, but in the food wasted? For chow that is unattractive to the *n*th degree, hospital food is usually the prize winner.

Hors d'Oeuvres

• *Spaghetti eating classes were recently inaugurated by the National Macaroni Institute. The need for such schooling provides the Fascists with another example of our crude New World culture.*

• A year ago USDA economists predicted that farm prices would be down 15 to 20 percent by the end of the year, if a slow-down in general business activity developed. Bet they are mighty glad they put that "if" clause in there.

• *Powdered milk is known to have been produced as long ago as the 13th century. But not until World War I did it come into prominence. Some things take time, you bet.*

• A California canner is marketing canned lemonade. All you do is chill, open and pour. Saves all the trouble of buying and squeezing lemons, extracting and stirring in sugar and pumping water from the well.

• *The California legislature has made a* $800,000 *grant to the U. of C. to try to find the sardines that have not visited their usual off-coast haunts for two years. Besides seriously crippling an industry, this sardine snub is darned embarrassing to the state's chambers of commerce.*

• Dr. Albert F. Yeager, U. of New Hampshire, is no taker for granted, according to the Farm Journal. He's been taking the temperature of cucumbers and has found them to be as much as 20 deg. warmer than the surrounding air. We've always wanted to take the temperature of "a cool $1,000,000," but accurate thermometers are so hard to come by.

• *The U. S. Brewers Foundation comes up with a bit of dictionary research, to wit: The word "bridal" is derived from bride-ale. Let's see the WCTU get around that one.*

• Durkee Famous Foods remind us that their green—red—and—white spice package has again won the blue ribbon award at the national packaging show. The yellow ribbon would harmonize nicely, too. J.A.J.J.

MODERN fish cannery in Denmark displays Danish flag. Plans for this plant were drawn up by the Technological Laboratory of the Danish Department of Fisheries.

DANISH technician weighs up fish that were used to test two methods of icing.

State Research in Denmark

Danish government food technologist offers his solution to problem of bringing modern scientific developments to the attention of industry

By MOGENS JUL, Director, Technological Laboratory
Department of Fisheries, Copenhagen, Denmark

THE problem of bringing the latest scientific developments into use in the food industry is much the same in Denmark as elsewhere. Our experience here has shown that it takes great effort to make advances of science first known and then accepted. This is true mainly because so much food is handled by the individual farmer, fisherman, food merchant or food processor, whose work is often guided more by tradition than by science.

In the technological laboratory of the Danish Department of Fisheries we have been confronted with this problem. Like many other scientific institutions, we were perhaps inclined to take systematic scientific work as the main purpose of our activities. But while this sort of work is very important, we soon found that engaging in it exclusively would be the first mistake we could make when trying to give scientific help to food industries. We realized that the industry we were trying to help was faced with a large number of basic problems that could not be solved without considerable scientific knowledge. And most concerns in the fishing industry of our country were comparatively small ones, employing no university trained people. We saw that by helping the industry with these simple problems we could be of considerable assistance. And we also found that if we did not cope with this problem, any scientific results that we might obtain by purely scientific activities would be of little or no use to the fishing industry of our country.

Sterilization by Tradition

For instance, one of the first tasks we realized we would have to handle was to encourage a further development of the fish canning industry in Denmark. Now one of the greatest problems of the existing fish canning industry was that of proper sterilization. What would be more natural for us than to occupy ourselves with research on processing of canned fish in accordance with the principles that are generally used in the U. S.? But this might have been useless to the Danish industry, which at that time was using only old tradition in determining heat processing. One could even encounter foremen in charge of processing in a plant who did not believe in bacteria. Therefore, scientific methods would not be understood, and it would take a long time indeed before they were utilized in the industry itself.

In the meantime the industry would be left alone and would be using its rather crude methods at a considerable risk. It became necessary, therefore, for us to let pride go by the board—in a scientific sense—and more or less feel our way ahead. By virtue of our own scientific knowledge and by use of various foreign scientific publications we found that we were able to give considerable assistance to the industry and to help it overcome the primary difficulties. By approaching the industry with this in mind we soon had it using, not very refined methods, but at least methods that were entirely satisfactory at that time. Then later we were able to get into the routine of more specialized methods for the determination of heat processing data,

utilizing such methods for further improvement of the industry.

Scientific Language a Mistake

A second mistake that we—and, perhaps, most young scientists working in research institutions—were inclined to make was to publish the results of our work in scientific language only, and in the scientific periodicals. This is, of course, a great satisfaction to the scientist himself, and it is also of great value in the collaboration between various scientific institutions. However, this means of publication is often of little if any use to the industry itself, for a great many people in the food industry are not able to fully appreciate work written in scientific language. Usually they do not even see those scientific periodicals.

In one case, for instance, a government laboratory in Denmark was urged to write an article on the manufacturing of a certain food product, which could not be imported during the war, and which simply had to be made in Denmark. The laboratory's article turned out to be a very scientific one with a great many formulas and many discussions about scientific theories. An investigation made later proved that not a single person within the industry had ever read the article. Among those interviewed were several university trained persons who would certainly have been able to appreciate the contents of this article; but they did not think it worth while to study it, as they found too little in it they could utilize in their work. So while it still might have been a valuable contribution to science, it was of no direct value to the food industry. But this had been the purpose of the whole article. My impression is that one has to realize that such publications may further science, but, as a rule, they will not further industry itself.

Brief Reports Reprinted

After this and similar experiences we decided to use the following procedure every time we publish anything from this laboratory: A detailed description is given in a scientific journal or in one of our own publications. The primary purpose of this is to give scientists in related research work information about our work. Besides this we always publish a brief report which gives a short description of the results in such form that it can be utilized by the industry itself directly. Reprints of these brief articles are sent to all manufacturing companies within that industry and to persons in the industry itself, to call the attention of all interested parties to the work. In this way we are reasonably sure that everybody concerned has easy access to these results.

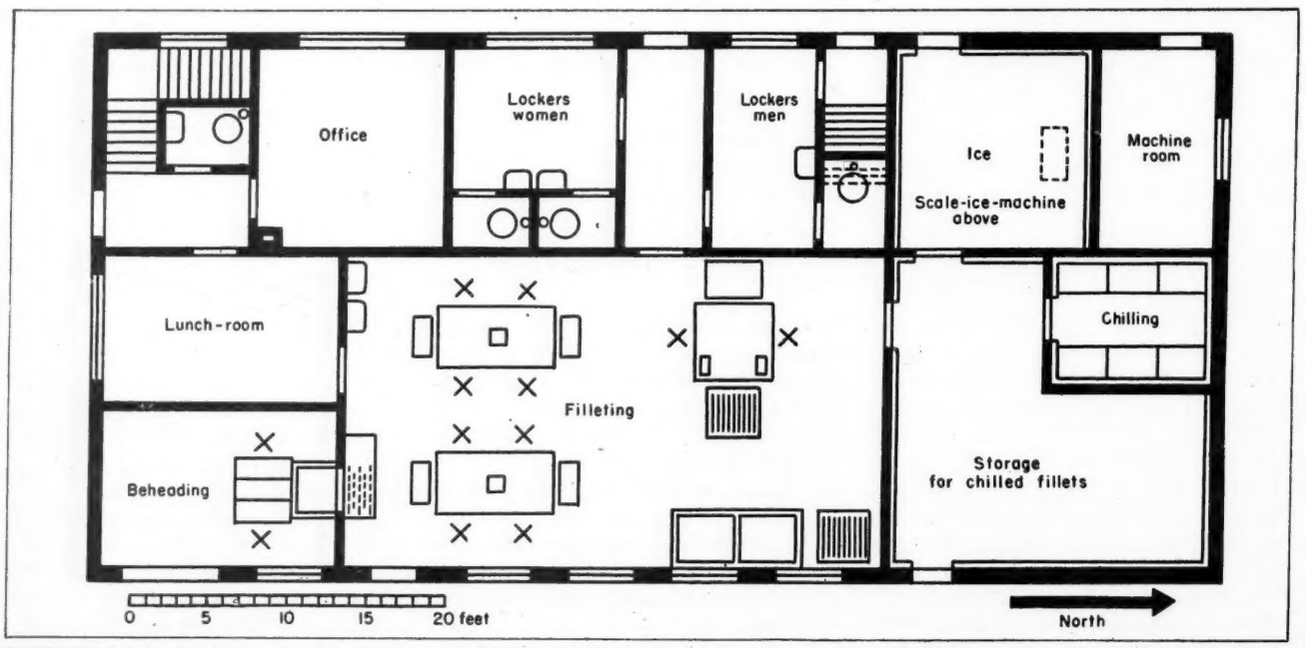
Now imagine my surprise once when I visited a small fish curing plant! The owner asked me a question, which we had recently given detailed information about in a reprint sent to the industry. So I asked him whether he might not have received this. He hadn't, he said, but soon I found the reprint concerned, covered with dust, right on his desk. He was just too busily engaged in practical work to do much reading.

Personal Contact Important

This is another mistake that can easily be made in doing research. A great many people in small enterprises are so busily engaged in their daily work that they can hardly find time for doing any reading, and as a matter of fact a great many of them are not used to getting any information at all through the printed word. For this reason a personal contact between the research worker and the man in industry is of primary importance, as sometimes it is the only way by which new methods can be quickly introduced into industry.

But even in this respect we discovered how easily mistakes are made. For instance, one is very inclined to start telling the practical worker about the mistakes he makes and the misconception he may have of different chemical or technological procedures. And if he does not accept the explanation right away one may try to start a long and intricate scientific explanation in terms of bacteriology and chemistry. This may very easily lead to the person telling you that he has been handling fish for the last 40 or 50 years, so he should know best. This argument is difficult to meet. But it is even worse if it is not stated at all. Because, as a rule, people in the fishing industry are men of few words. Very frequently they will let the young scientist talk and possibly even make him believe that they accept his explana-

(*Continued on page* 226)



BLUEPRINTS of this kind are supplied by the Danish Technological Laboratory to anyone in the fishing industry requesting such information. This particular drawing shows a small fish filleting plant with a production capacity of 400 lbs. an hour.

OFFICERS and executive board of the A.B.C.B. Seated, left to right: Wilbur H. Glenn, Columbus, Ga.; John F. Leary, Newburyport, Mass.; A.B.C.B. secretary John J. Riley, president Thomas F. Mansfield, vice-president Truman M. Gill; James C. Lee, Birmingham, Ala; James H. Carmichael, Jackson, Mich.; George S. Derry, Philadelphia. Standing: R. C. Moody, Little Rock; Joseph F. Nerney, Attleboro, Mass.; A. G. Beaman, Nashville; R. A. Jolley, Greenville, S. C.; E. A. Bostrom, Grand Forks, N. D.; Burton N. Arnds, Los Angeles; Joseph LaPides, treasurer A.B.C.B., Baltimore; Edward Wagner, Cincinnati; Paul F. Glaser, Seattle; A. B. Hatcher, Charleston, W. Va.; J. W. Milner, Gulfport, Miss.

Public Relations Stressed At Bottlers Convention

Five-day Atlantic City meeting of American Bottlers of Carbonated Beverages establishes attendance record. Bottlers hear speakers from various fields, see unusual films, view new products and equipment

By ARTHUR V. GEMMILL, Assistant Editor, "Food Industries."

OVERALL public relations, including management-labor contacts, were heavily emphasized at the 29th annual meeting of the American Bottlers of Carbonated Beverages, held in Atlantic City in mid-November. The theme touched upon by practically every speaker at the three-day general session, and at many of the special sessions, was keynoted by President Thomas F. Mansfield, Newark, N. J., who pointed to the close human relations enjoyed by the industry, due to its make up of small businesses. "Whenever any phase of human relations gets too far off the beam," he stated "certain adjustments must follow. It is only a matter of time before the natural force which abhors excesses and favors equity will assert itself and bring about the leveling-off process."

The sessions, of course, touched upon every phase of bottling plant operations. In addition, the first post-war International Beverage Exposition was held. Displays of equipment and products of the 227 exhibitors completely covered the floor of the huge convention hall.

A number of new beverages were introduced and many pieces of equipment were displayed for the first time—some so new that descriptive literature was unavailable. The new, completely equipped A.B.C.B. Field Laboratory was displayed for the first time. It attracted wide attention among the over 4,000 member and non-member bottlers in attendance.

Technical Meetings

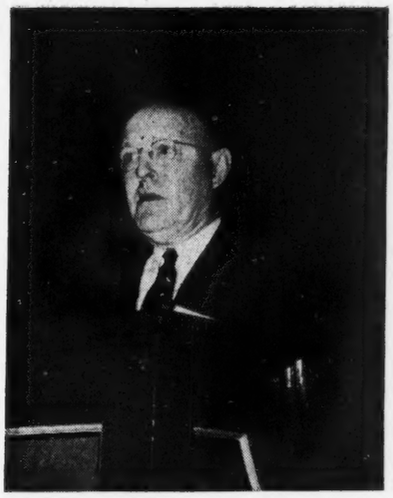
Programs of the five-day special technical meetings dealt with sanitation, production problems, merchandising and labor relations. The opening meeting, presided over by A.B.C.B. vice-president Truman M. Gill of Beeville, Tex., was devoted to sanitation and plant construction. Speakers included Henry E. Medbery, techical service director A.B.C.B.; Dr. Walter L. Obold, president, Board of Health, Haverford Township, Pa., and Director of Food Technology, Drexel Institute of Technology, Philadelphia, Pa., and Dr. S. S. Epstein, vice-president and chemist, Kirsch's Beverages, Inc., Brooklyn, N. Y.

Mr. Medbery, in speaking on "Some New Phases of the Sanitary Question," stressed the need for modern and efficient sanitary plant practices, together with the use of the purest ingredients obtainable. With the end of sugar rationing, he stated, either the incidence of spoilage has increased alarmingly, or plant operators are becoming more conscious of its presence. Mr. Medbery pointed out that the presence of yeast accounts for 90 percent of all carbonated beverage spoilage.

Speaking on the subject "The Health Official Looks At the Bottling Plant," Dr. Obold stated that the increasing number of laws and ordinances prescribing sanitary practices make the responsible bottler realize the necessity of such practices in the bottling plant. If he will follow his operating manual and the A.B.C.B. sanitary code, however, he will not know there are any laws or restrictions and the health officer will be his best friend.

In evaluating the sanitary condition of the plant Dr. Obold stressed: (1) Its location; (2) that

BOTTLERS demonstrated a lively interest in the new A.B.C.B. Field Laboratory and in the equipment and products exhibits which covered the entire main floor of the Atlantic City convention hall.



PROMINENT at bottlers' meetings: Left, Thomas Moore, Minneapolis, receives 1947 Medal for outstanding service from Fred S. Gould, Atlanta. Center, Thomas G. Spates, vice-president, General Foods Corp., stresses employee employer relations. Right, Dr. Gerald Wendt, Editorial Director "Science Illustrated," speaks on "Scientifically What's New?"

the building should be used for no other purpose; (3) that it should be large enough to properly house all necessary equipment; (4) that the floors should be smooth, impervious to organic matter, properly sloped and flushed daily with a germicidal solution, and (5) that walls and ceiling be clean and washable. Dr. Obold stated that, although sugars vary greatly in microbiological content, no health hazard existed in a properly made sirup of 32 Be.

Discussing "Can An Old Bottling Plant Meet Sanitary Requirements?" Dr. Epstein said that the answer is entirely in the hands of the owner or management. "An affirmative position requires first, a desire and secondly, the necessary information."

Two phases of sanitary requirements were emphasized. The first involves good housekeeping practice. "Maintaining a plant that is clean to sight, touch and smell accomplishes this phase," said Dr. Epstein. "The second phase calls for the exercise of practices directed toward the elimination or minimization of microbial contamination of the bottled carbonated beverages. Toward that end, some important knowledge is necessary. The means of acquiring that knowledge is available. It is for the bottler to decide."

President's Address

In his address opening the first general session, Thomas S. Mansfield summed up his year of service as president. He enumerated the difficulties which are still confronting the beverage business, and which, he said seemed insuperable at times. These include taxes, labor and rising costs. Individual enterprise is an integral part of the carbonated beverage business. The speaker pointed out, however, that freedom of enterprise carries with it important responsibilities; the basic rules of fair play and fair competition must be observed. The bottler must advertise and merchandise his goods. To do this he must study consumer thinking.

Mr. Mansfield spoke of the purpose of the association as one of promoting the interests of the bottling industry. Conferences have been held on the subjects of job evaluation and aptitude tests which reflect the increasing supply of labor.

Speaking on "Our Times and Our Problems" Harold G. Hoffman, former governor of New Jersey, emphasized the need for continuing free enterprise, opportunity for individual achievement, and the continued privilege of free speech. He assured the audience that it was not a Russian problem that we faced today, but a communist problem. He felt that our present attitude toward communists in this country "was making big shots out of little jerks."

Dr. Gerald Wendt, Editorial Director of "Science Illustrated," speaking on the subject "Scientifically What's New?" said that television is here and should be available in schools, churches and wherever people go for relaxation.

He predicted that within 25 years atomic energy would be harnessed for power. With the power problem solved there will be a redistribution of population. Great industries will move west of the Mississippi.

Advancement of medical science has added 10 years to life expectancy. Human senses have been improved upon by radar, the electric eye and the proximity fuse. All this adds up to automatic operation and control in factories. This means more production from labor; more time for recreation, and a higher standard of living for the American people.

Dr. Wendt said that carbonated beverages appeal to the youth, who like new things. He advised the assembled beverage manufacturers to create new synthetic flavors, not to attempt to imitate the natural flavors. He cited the perfume industry as one which had been successful in popularizing synthetic odors.

Plant Problems

The Tuesday afternoon special meeting, devoted to plant problems, was presided over by Mr. Medbery. Speakers were: Dr. H. S. Paine, vice-president in charge of research and development, Refined Syrups and Sugars, Yonkers, N. Y.; Hildig Gustafson, chief chemist, Infilco, Inc., Chicago and G. G. Ellner, director of research, Elenite Co., New York.

Mr. Paine listed 12 advantages accruing to the industrial sugar consumer by the use of liquid sugar in his talk on "Liquid Sugar in Beverage Manufacture." He suggested that, due to the progressive inversion of sucrose in acidulated beverages, it might be of some advantage to use a liquid sugar containing sucrose and invert sugar in approximately equal proportions.

Mr. Gustafson, speaking on "War and Post-War Developments in Water Treatment," discussed the compression method of distilling water, diatomite water filtration, the various zeolite processes, and resin exchangers.

(*Continued on page* 214)

BOTTLERS demonstrated a lively interest in the new A.B.C.B. Field Laboratory and in the equipment and products exhibits which covered the entire main floor of the Atlantic City convention hall.

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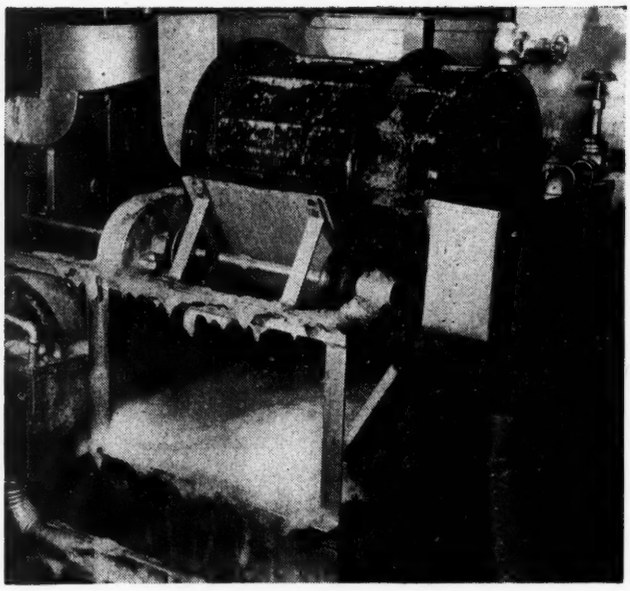
CORN HUSKER. Accumulation of broken grains and juice on machine and chute demonstrate the need for a continuous clean-up.



WATER RETURN from tubular blancher. Note foam overflowing onto frame and sides of tank. Frequent hosing is needed.

How To Establish A Plant Cleaning Program

PART I—The first requisite is the selection and training of a clean-up crew under the direction of a capable foreman. Criteria of cleanliness are established by a survey and time schedules and procedures worked out

By IRA I. SOMERS, National Canners Association Research Laboratories
Western Branch, San Francisco, Calif.

IT'S easy to say "Let's clean up." The task of organizing a satisfactory food plant cleaning program is, however, much more difficult. A clean-up crew must be selected, adequately trained and equipped with the proper tools.

Improved cleaning and construction technics should be adopted. Among the improvements to be consired are: Use of high pressure equipment and new cleaning aids; chlorination of the water supply; remodeling equipment to eliminate cracks, corners and dead ends; the building of equipment which can be opened up or dismantled for cleaning, and the construction of hoppers, flumes, fillers and other conveying mechanisms so that spillage does not occur.

The Clean-Up Organization

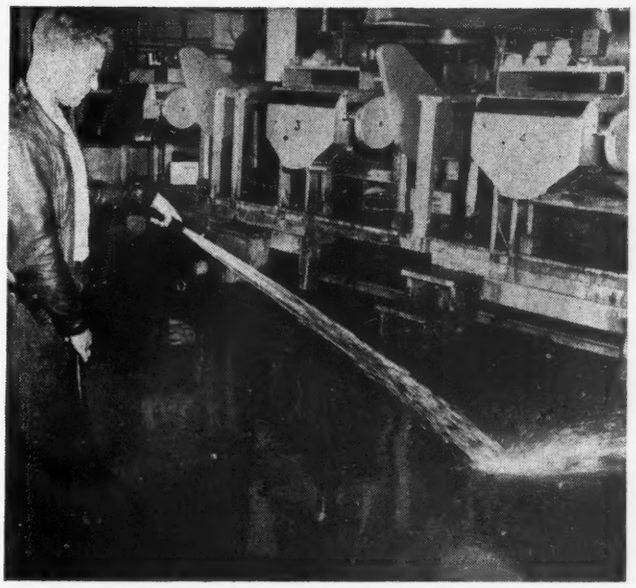
The first requisite in planning a cleaning program is the selection of a crew under the direction of a first rate foreman. This foreman should have as his responsibility the cleanliness of the plant. The crew may be composed of regular production men or it may be a special crew selected for the job, depending on the size of the plant. The preferred arrangement is to have a special crew to do only clean-up and sanitation work. They may be called the "Sanitation Crew," and in order to keep their interest the work should be made as attractive as possible. They should be given a feeling of importance. This crew should be a permanent part of the organization.

When the separate crew is employed, it is desirable to use a staggered shift, whereby the clean-up men start work about two hours after the production personnel. This means they arrive in time to do some general cleaning during the morning before too much debris has accumulated. During the luncheon shutdown they put in the rest of their morning shift cleaning thoroughly such equipment as may need it. This arrangement also provides for a crew to stay on and clean the plant after the day's operations cease without too much extra time being charged. If the plant is large it may be necessary to add extra men to the crew for the night clean-up.

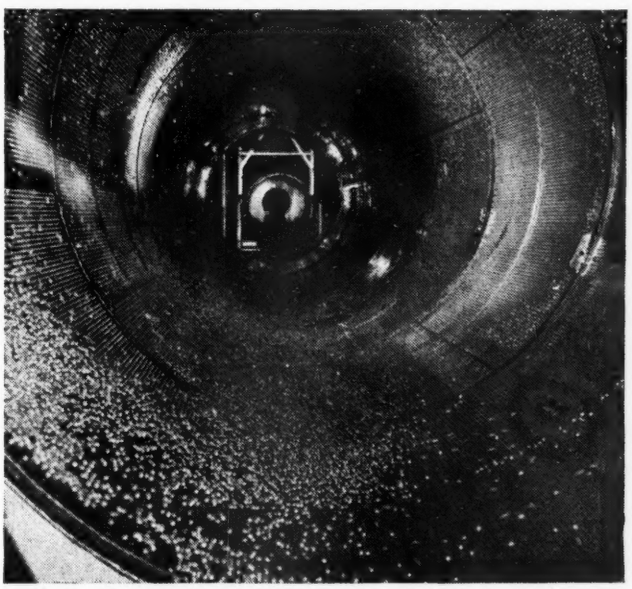
When production men are used it is still advisable to have a few men to do continuous clean-up work during the day, because if the food is to be continually protected against contamination the sources must be continually removed.

This is the first part of an article on establishing a food plant cleaning program. In it the author discusses organization, problems and general methods. It is designed to help in planning the program, and in the selection and training of a clean-up crew to give satisfactory cleaning in a minimum of time, with a minimum crew and at a minimum cost. In the second part, cleaning tools, equipment, detergents and bactericides will be discussed with instructions for their effective uses.—The Editors.

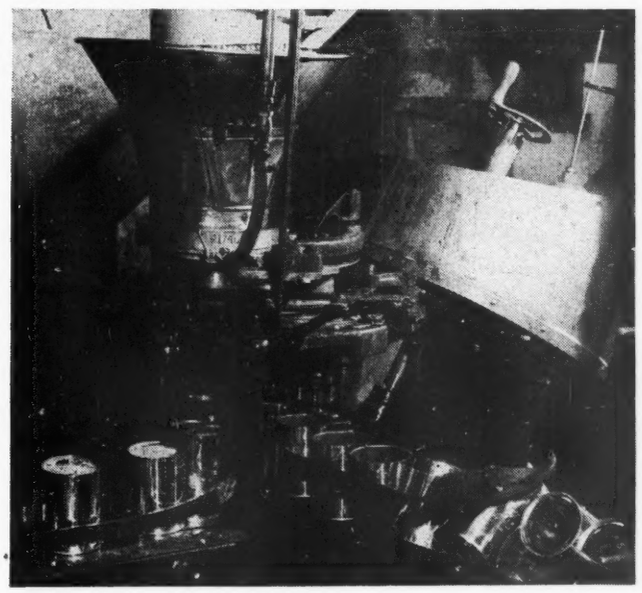
SWEEPING waste into a flume is a good continuous clean-up method when the flow of water is sufficient to carry it away.



FLUSHING equipment and floors is an easy way to maintain a clean plant. Use of chlorinated water helps to control slime.



PEAS lodged in holes inside grader will sour if allowed to remain too long. This equipment should be cleaned every four hours.



FILLERS have some crevices which harbor bacteria. They should be cleaned frequently to prevent bacterial contamination of food.

Training of the clean-up crew is important. They should be given training in procedures for using special cleaning tools, methods of dismantling equipment, correct approach to cleaning, significance of contamination and hazards involved. In addition, the crew should know for what purpose specific detergents and germicidal agents are particularly adapted, and on what surfaces they should not be used. The clean-up men should also have enough background to know why a certain procedure is employed.

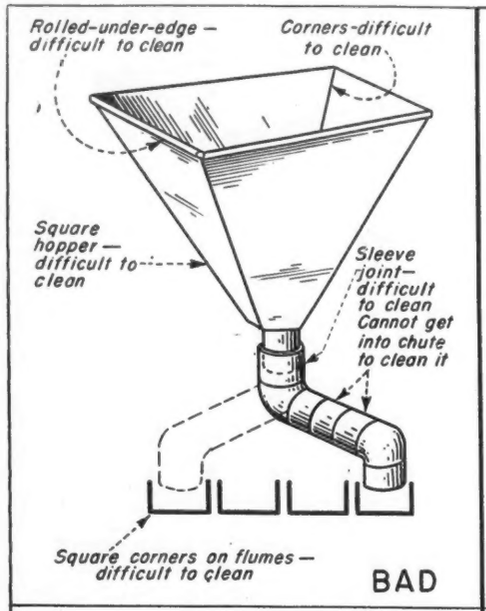
The crew should be kept up to date on any new developments and should be given the best tools and cleaning materials. It is desirable to encourage them to make comparative investigations of cleaning methods, because better procedures are often developed in this way.

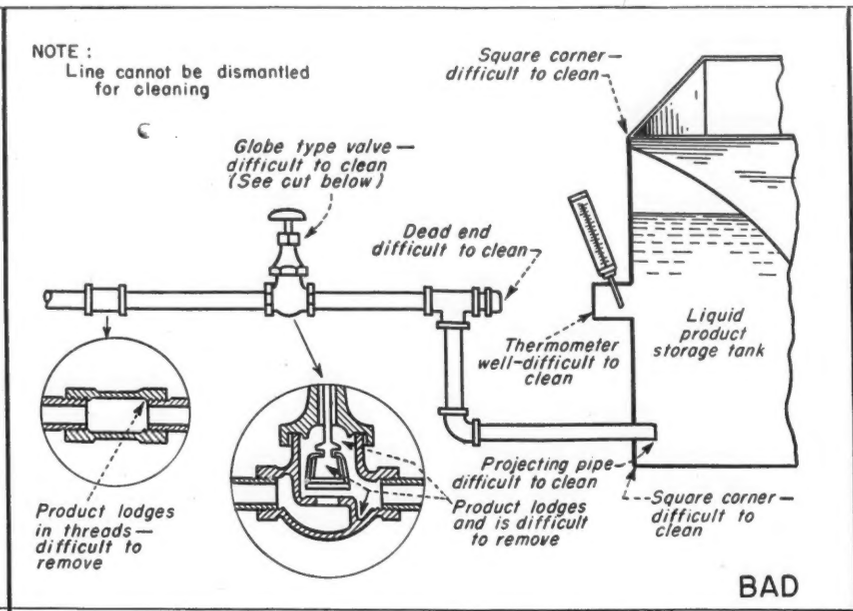
Planning the Clean-Up

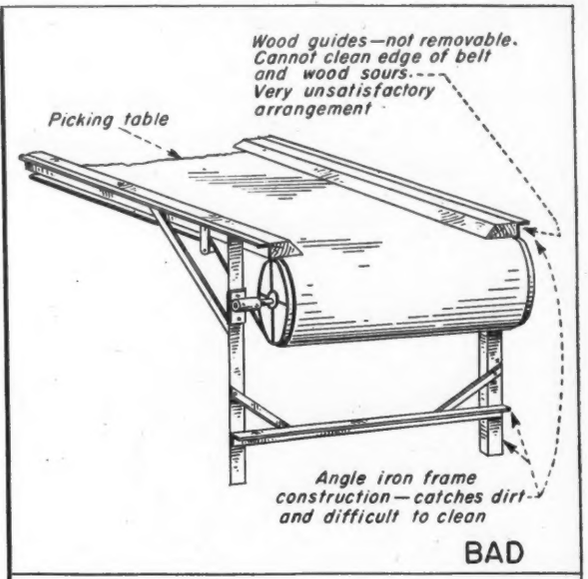
An important step in organizing a cleaning program is the establishment of criteria of cleanliness. Unless a man knows what he is trying to accomplish he is not likely to do the job expected. The criteria of cleanliness may vary from plant to plant, but at least some general suggestions can be made. All possible contaminants should be eliminated, and the opportunity for their entering the food completely avoided. Machinery, belts and floors should be free of slime, mold growth, scale deposits and spilled food particles. The cannery should smell sweet, with all objectionable odors eliminated by cleaning and not by substitution.

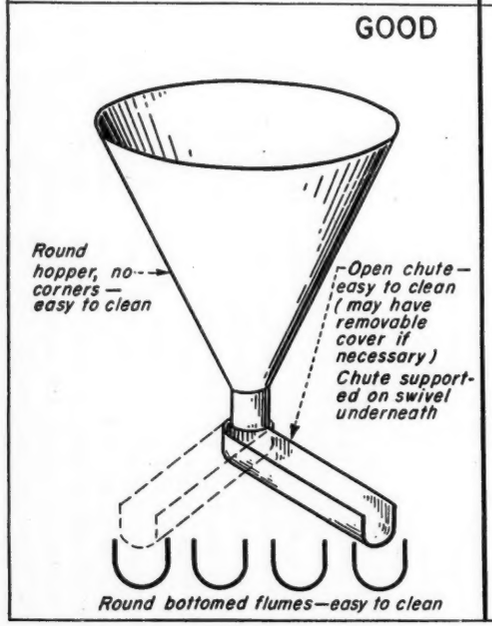
Once the goal has been set it is advisable to make an equipment survey to determine the extent and frequency of cleaning necessary to assure the standards of cleanliness desired. The equipment should be checked for places in which, or on which, food particles may lodge, and bacteria or slime may grow. Areas such as cracks, crevices, corners, rough surfaces and dead ends are likely places for the growth of bacteria and mold if conditions of moisture, food supply, and temperature are favorable for multiplication of these organisms. The likelihood of any of these contaminants entering the food should be investigated.

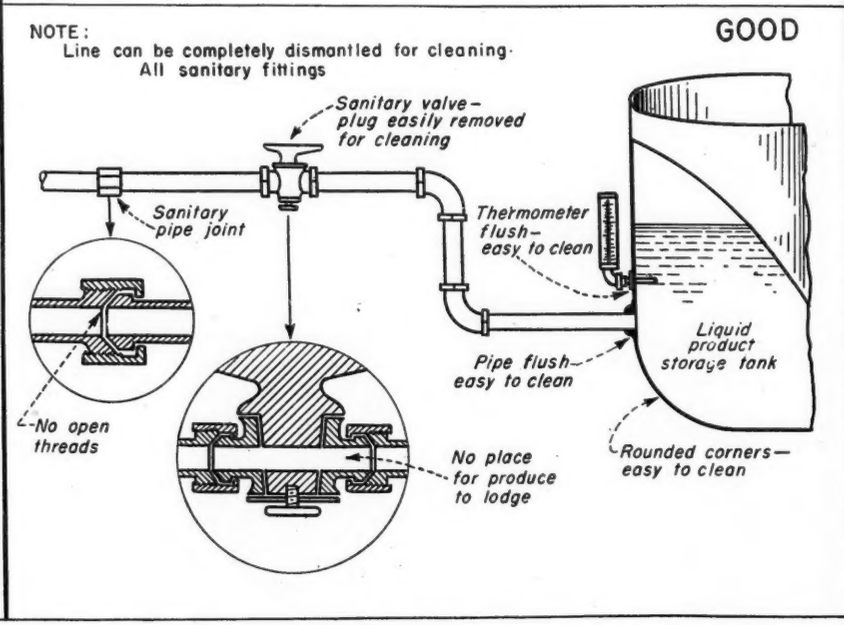
Construction of Pipe Lines and Equipment in Many Plants Is Such That They Cannot Be Dismantled for Cleaning

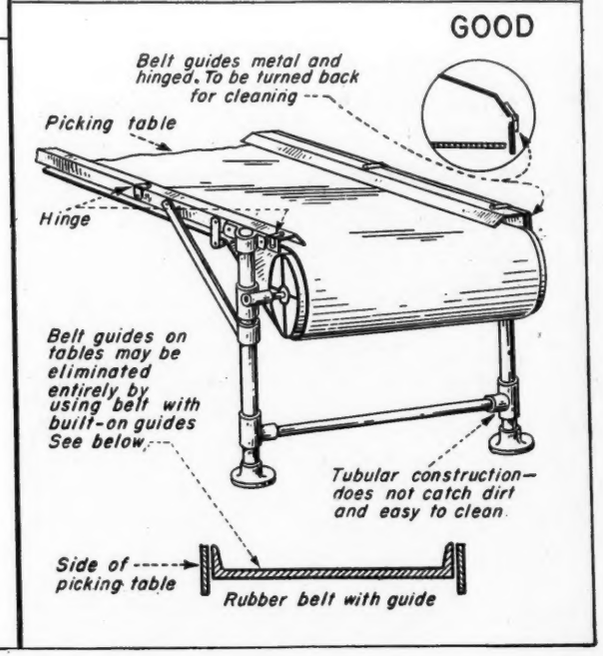

Rolled-under-edge — difficult to clean
Corners-difficult to clean
Square hopper — difficult to clean
Sleeve joint — difficult to clean Cannot get into chute to clean it
Square corners on flumes — difficult to clean
BAD


NOTE: Line cannot be dismantled for cleaning
Square corner — difficult to clean
Globe type valve — difficult to clean (See cut below)
Dead end difficult to clean
Thermometer well-difficult to clean
Liquid product storage tank
Projecting pipe-difficult to clean
Square corner — difficult to clean
Product lodges in threads — difficult to remove
Product lodges and is difficult to remove
BAD

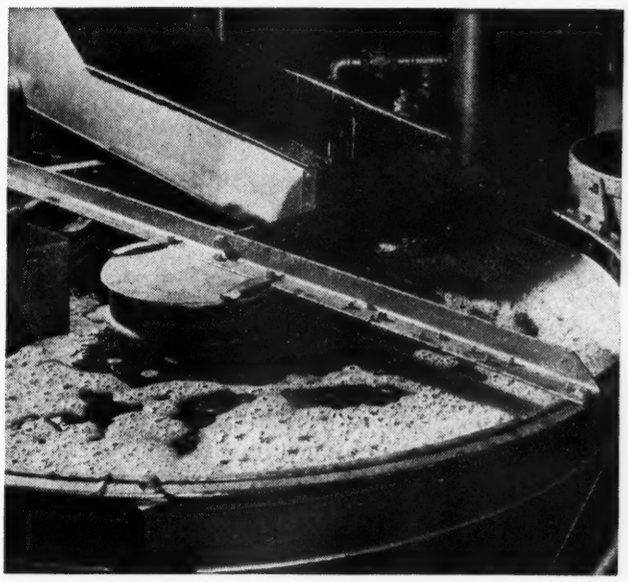

Wood guides — not removable. Cannot clean edge of belt and wood sours. Very unsatisfactory arrangement
Picking table
Angle iron frame construction — catches dirt and difficult to clean
BAD


GOOD
Round hopper, no corners — easy to clean
Open chute — easy to clean (may have removable cover if necessary)
Chute supported on swivel underneath
Round bottomed flumes — easy to clean

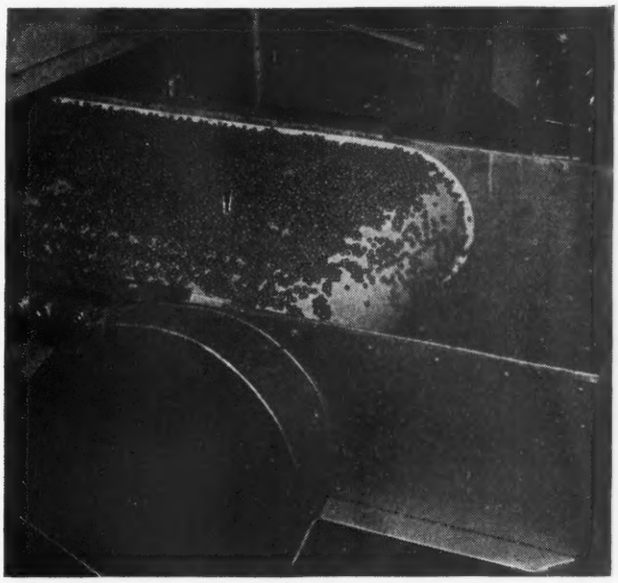

NOTE: Line can be completely dismantled for cleaning. All sanitary fittings
GOOD
Sanitary valve — plug easily removed for cleaning
Sanitary pipe joint
Thermometer flush — easy to clean
Liquid product storage tank
Pipe flush — easy to clean
No open threads
No place for produce to lodge
Rounded corners — easy to clean


GOOD
Belt guides metal and hinged. To be turned back for cleaning
Picking table
Hinge
Belt guides on tables may be eliminated entirely by using belt with built-on guides See below
Tubular construction — does not catch dirt and easy to clean
Side of picking table
Rubber belt with guide

Many Pieces of Equipment Are Built With Areas on Which Debris Can Accumulate



TANK with angle iron construction permits peas to accumulate. The peas deteriorate rapidly and can easily contaminate food.



PICKING BELT with built-on guides. Such a belt is easily cleaned. Square hopper and angle iron frame are troublesome.

As a result of the survey, the equipment and canning areas should be grouped according to the amount of cleaning necessary, as follows: (1) Areas needing constant attention; (2) areas needing attention every 4 or 5 hours; (3) areas needing attention every 8 or 10 hours; (4) areas needing daily attention; (5) areas needing weekly attention, and (6) areas needing annual attention.

After completing the survey, written instructions for cleaning each piece of equipment should be given wherever practicable, listing the procedures step by step, and giving the approximate times necessary. Experience may alter these instructions; nevertheless, it is desirable to make them as complete and exact as possible.

The clean-up program should be year-round, so that employees are always conscious of sanitation, and it should fit into a long range planning program for changes in equipment design and construction.

Degrees of Cleanliness

There are three phases to cleaning, namely: Physical, bacterial and chemical. Physical cleanliness is freedom from gross debris such as spillage, trimmings and slime; bacterial cleanliness is freedom from bacteria, and chemical cleanliness is freedom from objectionable chemical substances such as cleaning compounds, bactericides, water scales and oils.

The degree of physical cleanliness is usually revealed by a visual inspection; to be absolutely certain the equipment is clean, however, it should be checked for the presence of slime, which can best be done by feeling the different surfaces. If they are slick, slime is probably present and more cleaning is needed. The presence of an odor is also a good indication that the plant is not "physically clean."

Obtaining physical cleanliness is always the first step in a cleaning operation, because bacterial and chemical cleanliness cannot be accomplished if slime or any other organic matter is present.

Bacterial cleanliness is usually accomplished by applying a bacterial-killing agent to the surface, and while experience has shown that such a treatment does not necessarily kill all the bacteria, their numbers can be greatly reduced in this way. Thus the possibility of contaminating the food with bacteria is reduced. The frequency of applying a bactericide depends on the possibility of contamination from the surface. If the possibility exists, bacterial cleanliness should be maintained as completely as possible. The bactericides used at present do not destroy the spores of thermophiles—flat sours and others. Prevention of contamination with these spores is accomplished by cleanliness, and proper construction and temperature control.

Chemical cleanliness is essential because even small traces of certain chemicals can affect the taste, odor, color or quality of food products. Also, some of the cleaning or germ killing agents, if found in canned foods, would be considered adulterants by the U. S. Pure Food and Drug Administration. Most of the materials in this category can be easily removed by washing equipment with plenty of fresh water. Certain deposits such as scales require additional treatment for their removal.

When to Clean

To keep a plant clean it is necessary to have a program which provides for a frequent or continuous clean-up of equipment, as well as a clean-up at the end of the shift. The purpose of the continuous clean-up is to keep waste from accumulating during the operating day. In addition to maintaining cleanliness and preventing contamination of clean food, this saves on shut-down time needed for cleaning.

Equipment should be cleaned as soon as operations cease, because food particles can be removed much easier when they are wet than when they are dried onto a surface.

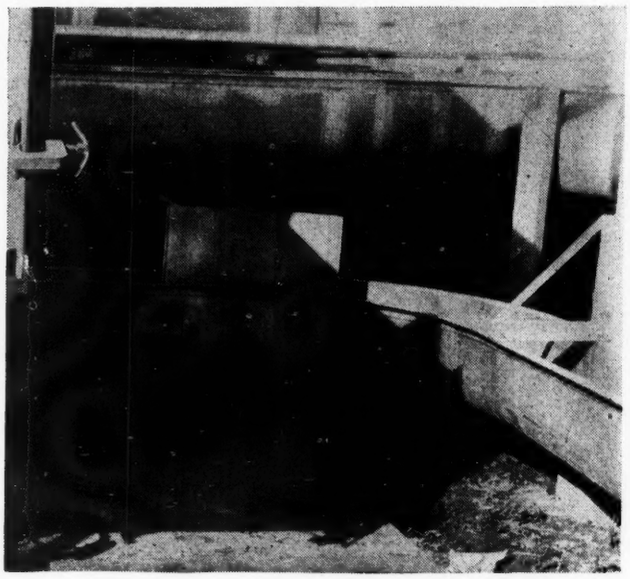
Areas, or equipment such as fillers, closing machines, peelers, graders, washers and sorting belts, on which any amount of debris accumulates, should be cleaned at least every 4 or 5 hr. and treated with a bactericide at least once for every 12 hr. use. All other equipment used in the handling, conveying or preparation of foods should be thoroughly cleaned as frequently as possible or at least at the end of each shift.

The Way to Clean

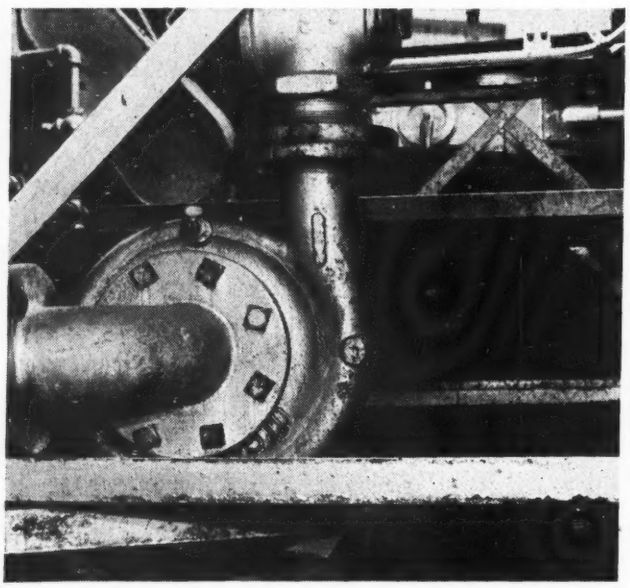
For the continuous or frequent clean-up, two technics may be employed. The waste may be brushed or shoveled from the equipment or it may be washed away with water.

Liquid Handling Equipment Should Have No Cracks, Corners or Dead Ends

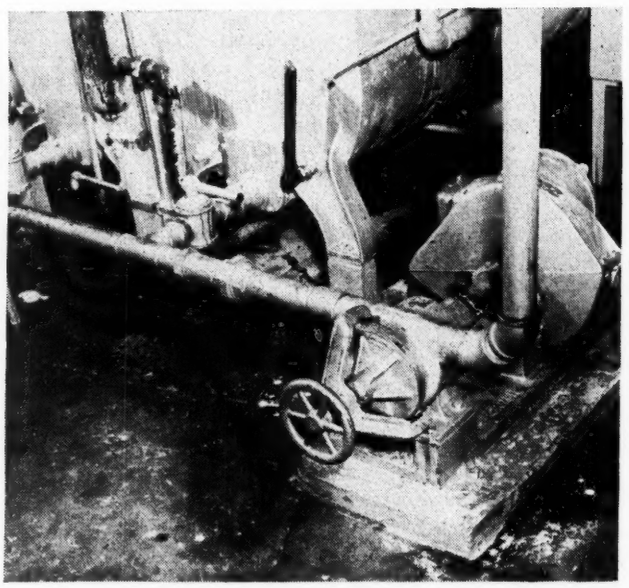
FLAT BOTTOMED FLUME, and round closed chute for discharging peas. Both the chute and flume are difficult to clean.



ROUND BOTTOMED FLUMES similar to these without dead-ends, by-passes or flow diversion plates are easy to clean.



PUMPS which cannot be dismantled for cleaning may contaminate clean products causing serious off-flavors and loss of quality.



SANITARY PUMPS are easily taken apart. When used for starchy or hot materials they should be scrubbed and soaked in cold water.

The dry, or shoveling, method is used where water would interfere with plant operations. Equipment for this type of cleaning includes a clean-up cart, shovels, brushes, brooms, mops and pails. When cleaning, the waste is brushed or swept from the machinery onto the floor, shoveled into the cart and hauled away, or it may be swept into flumes where it is carried by water to the disposal plant.

The clean-up procedure which provides for a frequent washing of the equipment with water is an easy and convenient way to maintain a clean plant, and if a hose is handy, most employees have no objection to flushing off the equipment at their station each time the machinery stops. If chlorinated water is used, such a practice also aids in the control of slime.

For the noon or end of shift clean-up some rather definite steps should be followed. These steps are given below and in general they can be applied to most cleaning jobs:

1. Dismantle the equipment as far as practicable in the time allotted.
2. After the equipment has been dismantled, wash off the bulk or gross debris using cold or warm water at 100 to 140 deg F. Pressure of this water should not exceed 100 lb., so that the waste will fall to the floor and not be splashed onto other equipment. Cold or warm water is recommended because hot water may coagulate or bake food particles onto the surfaces. When washing equipment it is advisable to start at the beginning of the operation or at the top, and wash down. If this is done there will be no danger of washing debris onto surfaces already cleaned. It is advisable also to have "cut outs" in the lines that can be opened during clean-up to throw wash water and debris onto floors rather than carrying it all through the canning lines. Brushes are handy tools to help dislodge food particles during the wash. After the equipment is clean,

(*Continued on page* 234)

Some '48 Food Supplies

Production of canned and frozen fruits and vegetables, while generally lower, will be ample to supply the domestic demand. Unbalanced stocks of both should be greatly improved by the end of the marketing season

FOOD supplies in the U. S. in 1948 are expected to be somewhat below 1947, according to the bureau of agricultural economics of the Department of Agriculture. They will still be above war and prewar years, however. This lowered production, in the estimates of the bureau, applies to fruits and vegetables, as well as to meat and grain.

A few specified foods are singled out in the bureau's outlook as likely to be in greater supply. These include sugar, cheese, butter, bananas and dried fruit. On the other hand, lard, sweet potatoes and chicken are mentioned as being notably short.

Canned Fruits

In the case of canned fruits, the estimates reveal that although the 1947-48 pack is moderately smaller than last year's pack, stocks at the beginning of the season were larger. Supplies for the season ahead, therefore, are nearly as large as they were last season. Imports, chiefly olives in brine and canned pineapple, are expected to be about as large as last year. Civilian supplies of fruit cocktail and fruit salad are expected to be slightly higher than 1946-47, canned peaches, pears and apples will be about the same, while canned apricots and pineapple will be slightly smaller.

The new pack of canned fruit juices, except grapefruit, should exceed the 1947 pack. Only slight increases are expected, however, in the citrus juice packs. There is no appreciable change in sight in shipments of pineapple juice from Hawaii.

Frozen Fruits

Frozen fruit production will be moderately higher. It is estimated that civilian per capita supplies of frozen fruit juice will, in 1948, continue at about 3½ lb., and those of canned fruit juices at about 15 to 16 lb. The new pack of frozen fruits was smaller than the 1946 pack, but stocks have been drawn on and the consumption rate is one-half pound higher.

Because of the dried fruit surpluses this year, USDA is purchasing substantial quantities of raisins, prunes, dried peaches and dried apples. Some of these purchases will go into the school lunch and other domestic feeding programs and others will be used in foreign relief.

Although the new crops of oranges and grapefruit appear smaller than those that were in prospect at this time last year, about as many oranges will be marketed fresh, though at slightly higher prices. Fresh grapefruit will be in plentiful supply, with prices about the same as last year. On the whole, civilian per capita consumption of all fresh fruit in 1948 is expected to continue at the 1947 rate of about 145 to 150 lb.

Canned Vegetables

While the canned vegetable pack is smaller, supplies should be large enough to permit continuance of the near-record consumption rate of around 45 lb. per capita. Moreover, the carryover next spring should be considerably below the heavy and unbalanced supply carried over from the 1946 pack.

The outlook for frozen vegetables has improved considerably in the estimates of the bureau. With the new pack probably smaller than the 1946 pack, stocks in freezer storage have already taken a favorable turn. On August 1, total cold-storage holdings of frozen vegetables were 297,000,000 lb., 67,000,000 lb. higher than a year earlier. By October 1, holdings, following the new pack, had increased to 354,000,000 lb., but were only 36,000,000 lb. larger than a year earlier.

The potato supply will be adequate. Both the total potato crop and the output of the 18 surplus late states, which supply the bulk of the storage supplies, are about equal to the 1936-45 averages, but are about 20 percent below last year. Market supplies of sweet potatoes, ample during the harvest season, will be below average for the remainder of the crop year, as the total 1947 crop is 8 percent below average.

The new crop of dry edible beans is slightly larger than last year and is about equal to the 10-year average. Dry field pea crops, on the other hand, are about 6 percent smaller than in 1946, but much larger than the average.

Meat Output

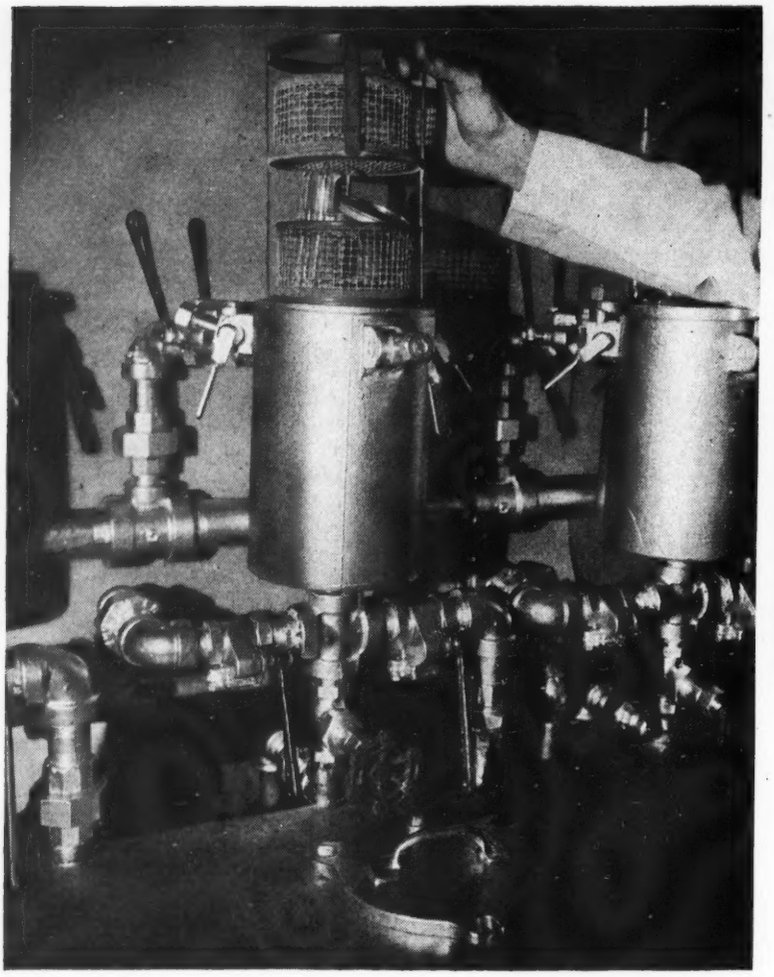
Total meat production in 1948 may be 1,500,000,000 lb. less than the 23,000,000,000 lb. produced last year. A large portion of this decline will be in beef and veal output, which is expected to be down about 1,000,000,000 lb. Pork supply for the first nine months should about equal last year's supply, but a smaller spring pig crop will reduce marketings in the final quarter. Lambs will be fewer and, like hogs, will be lighter fed.

Fewer chickens will be raised in 1948, reducing the egg supply as well as chickens for consumption. Carryover stocks of shell and frozen eggs on January 1 were expected to be from 40- to 60,000,000 doz. below Jan. 1, 1947.

Dairy Products

Civilian supplies of milk and dairy products should about equal the 810 lb. per capita consumed in 1947. This is about equal to the prewar average, but is about 5 percent below the wartime peak. Exports of cheese, evaporated milk and dried whole milk may be lower because of reduced foreign purchasing power. In this case more milk should go into butter production. The estimates look for an increase of about 5 percent in butter production.

Edible vegetable oils should be in greater supply, at least during the first half of 1948. Increases in cottonseed oil production will more than offset the slight drop in soybean oil. Output for the second half depends on the two crops next summer, although a slight decline is the more likely prospect.



MINIATURE retorts were used to establish relationship between thiamine loss at low pH and the conditions used in processing. Quick acting valves permit almost instantaneous come-up to temperature. Flooding with cold water cools the samples, preventing damage on the cooling side of the cycle.

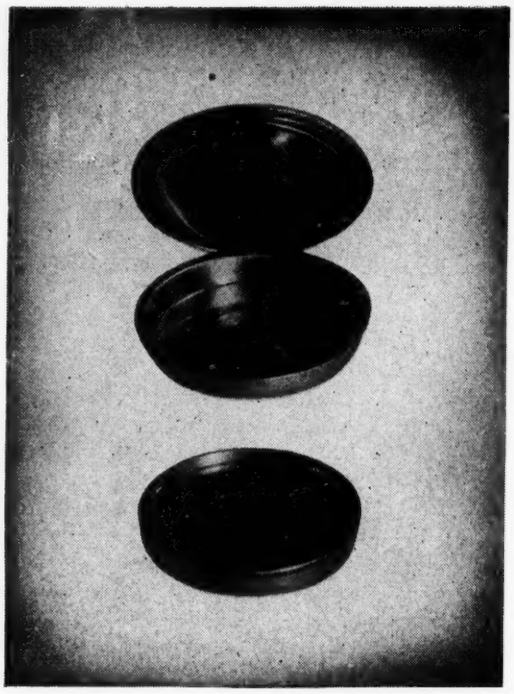


TABLE I—RELATION of Process Temperature to Thiamine Retention in Pork Luncheon Meat.

Process Schedule			
Time Min.	Temperature Deg. F.	Sterilizing Value—F_o	Thiamine Retention Percent
46½	230	3.6	60
7	245	3.6	87
1	260	3.6	91
130	230	10	43
19	245	10	70
2¾	260	10	93

[1]Tests made in thermal death time cans with nearly instantaneous heating and cooling.

TESTS made in thermal death time cans avoided lag in heating or cooling. RESULTS appear in table.

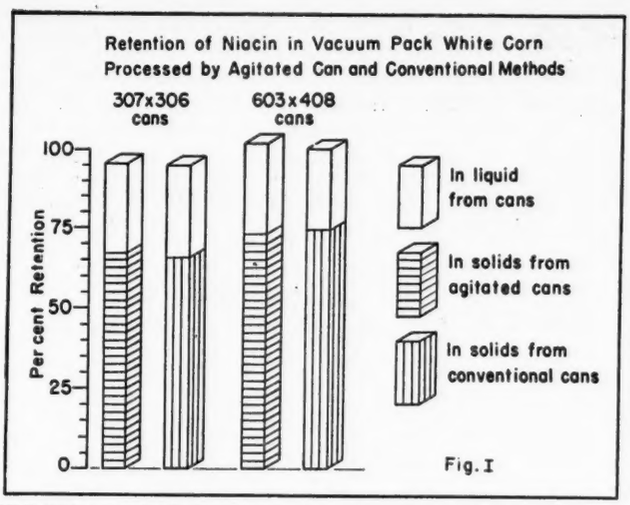
Retention Of Vitamins In Low Acid Canned Foods

New processing technics, especially the "high short" and agitating methods, favor retention of thiamine content by minimizing excessive heat treatment

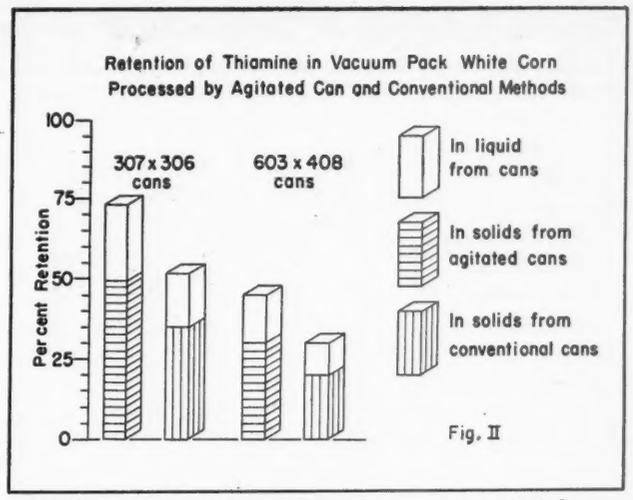
By J. F. FEASTER, MARDELL D. TOMPKINS and MARGARET IVES
Research Division, American Can Company, Maywood, Ill.

ALONG with engineering or mechanical problems arising in connection with new processing developments has come the equally important problem of the possible effects of these new departures on the heat-labile nutrients in foods. The biochemical group of these laboratories has engaged for some 15 years in the evaluation of the effects of new processing technics or principles on the nutrients in canned foods with particular reference to thiamine retention. It is the purpose of this report to describe some of the results on vitamin retention obtained during development of these new processing technics as well as some of the results obtained during their practical or commercial applications.

Many factors may condition the type and severity of thermal process used in commercial practice to produce a condition of commercial sterility in any given canned product. Among these are the pH of the food, the mode or rate of heat penetration into the product, the style of pack and the size of the



NIACIN is retained regardless of method of processing.



THIAMINE retention is higher when the cans are agitated.

container. Likewise, the initial temperature of the food within the can at the time thermal processing is begun may, on occasion, be an important consideration. Generally speaking, however, adequate thermal processing of the so-called "acid" foods presents fewer problems than the processing of the "low-acid" types[1] whose pH values fall above 4.5. It has been in connection with the latter class of foods that the substantial proportion of research and development work on thermal processing has been carried out over the past twenty years.

Conventional Processing

Conventional processing technics for low-acid foods most commonly involve the use of the "still" retort or pressure cooker usually operating at 240 deg. to 250 deg. F. For certain products, notably whole grain corn and evaporated milk, continuous pressure retorts have also found widespread commercial application. The time and temperature schedules required for adequate thermal processing of the most common types of low-acid foods have been well established and are available in the form of the National Canners Association Bulletin 26-L (6th Edition, 1946) for commercial application by packers of these products.

While these established thermal processes for low-acid foods have a long and impressive record of successful commercial application, evidence has been accumulated which indicates that the conventional "still" technic for processing may, in some instances, be attended by considerable sacrifice of quality characteristics such as color and flavor, and of nutrients present in the raw materials, notably the heat-labile vitamin, thiamine or vitamin B_1. In the current nutrition program jointly sponsored by the National Canners Association and the Can Manufacturers Institute, a number of reports have appeared which describe the effects of conventional methods of thermal processing on vitamin retention in common, low-acid canned products[2].

Heat Penetration Problem

Studies in the authors' laboratories have indicated that the effects of conventional thermal processing methods on food quality and nutritive level have been particularly pronounced in the case of those low-acid products which heat primarily by conduction. In illustration, in the conventional processing of products such as the vegetable purees and other conduction-heating low-acid foods, the rate of heat penetration at any given retort temperature may be so slow that the food near the container ends and walls must be over-cooked in order to insure commercial sterility in the food at the point of slowest heating within the container. This gradient in food quality and nutritive value between food in different portions of the can becomes even more extreme as the container size is increased, because of the increased time of process required for the larger can.

It has also been found that the development of new low-acid products may, in certain instances, be impeded if not prevented entirely, by conventional "still" processes. The severity of the conventional processing technics required for some new products, usually those of the specialty or formulated type, has often caused such distinct changes in the quality of the new product that it becomes entirely unacceptable to the consumer.

New Technics Described

The above considerations led this laboratory over 20 years ago to inaugurate an intensive program for improvement of existing conventional methods for thermal processing. From these studies to date have come three new processing technics which now find commercial application: The high temperature, short time, or "high-short" thermal processing of high-acid vegetable juices or vegetable juice mixtures to insure freedom from "flat can" spoilage organisms[3]; a new "high-short" processing method which, with aseptic filling and can closing, may be applied advantageously to low-acid, conduction-heating foods of a liquid or homogenous semi-solid nature[4]; and an agitated thermal processing technic for vacuum packed vegetables[5]. The two latter process developments in particular have shown marked advantages in food quality retention over conventional processing methods.

Effects of High-Short Processing

In an excellent review of methods for the sterilization of canned foods, Ball has discussed the various methods for "high-short" processing and has described some of the experimental work undertaken in these laboratories which definitely established the applicability of the "high-short" principle to homogeneous and to discrete-particle form foods to produce improved quality[6]. Since application of the "high-short" principle involves the use of temperature which may be considerably in excess of those employed in conventional thermal processing, studies on the effects of various time-temperature processing relationships on thiamine were begun as early as 1932. Some of the results of these early studies in which bioassay technics were em-

Vitamin Retention in Sample Packs of Vegetables

TABLE II—VEGETABLE PRODUCTS: Influence of High-Short and Conventional Processing Methods on Retention of Thiamine and Niacin.

Product	Process Type	Process Time Min.	Process Temp. Deg. F.	Process F_o	Thiamine Content Mg./100 g.	Thiamine Retention Percent	Niacin Mg./100 g.	Niacin Retention Percent
Pea Puree:								
Batch No. 1								
Before Processing	None				0.195	..		
High-Short Process	High-Short	0.63	283	25	0.169	87		
Conventional Process	Conventional	70	240	5.4	0.154	79		
Batch No. 2								
Before Processing	None				0.284	..		
High-Short Process	High-Short	0.63	283	25	0.244	86		
Conventional Process	Conventional	70	240	5.4	0.180	63		
Carrot Puree:								
Before Processing	None				0.044	..	1.02	..
High-Short Process	High-Short	0.63	283	25	0.038	87	0.94	92
Conventional Process	Conventional	60	240	3.2	0.034	77	0.97	95
Green Lima Bean Puree:								
Before Processing	None				0.042	..	0.51	..
High-Short Process	High-Short	0.63	285	33	0.036	86	0.49	96
Conventional Process	Conventional	70	240	5.4	0.026	62	0.42	83
Green Bean Puree:								
Before Processing	None				0.059	..	0.44	..
High-Short Process	High-Short	0.63	282	22	0.046	78	0.39	88
Conventional Process	Conventional	55	240	2.8	0.035	59	0.48	108
Cream Style Yellow Corn:								
Batch No. 1								
Before Processing	None				0.124	..	1.41	..
High-Short Process	High-Short	0.63	282	22	0.101	97	1.32	94
Conventional Process	Conventional	70	250	5.7	0.040	32	1.22	87
Batch No. 2								
Before Processing	None				0.055	..	1.12	..
High-Short Process	High-Short	0.63	284	29	0.054	98	1.11	99
Conventional Process	Conventional	85	240	9.3	0.020	36	1.08	97

TABLE III—VACUUM PACK WHITE CORN: Influence of Agitated Can and Conventional Processing Methods on Retention of Thiamine and Niacin.

Material	Can size	Thiamine content mg./100 g.	Thiamine content per can mg.	Thiamine retention percent	Niacin content mg./100 g.	Niacin content per can mg.	Niacin retention percent
				Batch No. 1			
Raw Corn		0.067	*		1.57	*	
Solids, After Agitating Process	307 x 306	0.044	0.109	51	1.32	3.26	65
Liquids, After Agitating Process	307 x 306	0.047	0.052	24	1.30	1.43	29
Solids, After Conventional Process	307 x 306	0.028	0.072	34	1.32	3.38	67
Liquids, After Conventional Process	307 x 306	0.033	0.036	17	1.29	1.42	28
Solids, After Agitating Process	603 x 408	0.030	0.339	35	1.46	16.5	72
Liquids, After Agitating Process	603 x 408	0.036	0.160	17	1.38	6.1	27
Solids, After Conventional Process	603 x 408	0.018	0.212	22	1.43	16.9	74
Liquids, After Conventional Process	603 x 408	0.025	0.101	11	1.22	5.4	24
				Batch No. 2			
Raw Corn		0.072	**		1.52	**	
Solids, After Agitating Process	307 x 306	0.042	0.105	46	1.33	3.32	68
Liquids, After Agitating Process	307 x 306	0.050	0.057	25	1.29	1.29	30
Solids, After Conventional Process	307 x 306	0.032	0.080	35	1.25	3.13	64
Liquids, After Conventional Process	307 x 306	0.036	0.041	18	1.32	1.49	31
Solids, After Agitating Process	603 x 408	0.023	0.262	25	1.44	16.4	74
Liquids, After Agitating Process	603 x 408	0.031	0.150	14	1.43	6.9	31
Solids, After Conventional Process	603 x 408	0.016	0.189	18	1.38	16.3	74
Liquids, After Conventional Process	603 x 408	0.019	0.086	8	1.44	6.5	29

*Raw Corn filled into a 307 x 306 can contained 0.218 mg. of thiamine and 5.02 mg. of niacin.
*Raw Corn filled into a 603 x 408 can contained 0.982 mg. of thiamine and 28.8 mg. of niacin.
**Raw Corn filled into a 307 x 306 can contained 0.230 mg. of thiamine and 4.86 mg. of niacin.
**Raw Corn filled into a 603 x 408 can contained 1.04 mg. of thiamine and 22.0 mg. of niacin.

ployed have been previously described by Lueck[7].

Working with buffered solutions of pure thiamine contained in thermal death time cans, Feaster and Pilcher studied the effects of thermal processing at temperatures between 180 deg. and 250 deg. F. for variable times up to a total process time of 60 minutes. It was found that as the pH of the medium increased from 3.5 to 7.0 a progressive decrease in thiamine retention was to be noted; pH and heating time remaining constant, thiamine retention was observed to decrease with increase in processing temperature; and at any fixed pH and processing temperature, thiamine sacrifice was found to be approximately proportional to the process time.

Eliminating Overheating

As the development work progressed, pilot-line or semi-commercial equipment became available which permitted the application of a uniform "high-short" sterilizing heat treatment to the entire mass of food. The application of heat in this manner permits the attainment of a condition of commercial sterility throughout the food and eliminates the local over-heating effects previously described as present in certain conventional thermal processing technics. Such equipment made possible the direct evaluation of the effects of "high-short" processing on thiamine retention in foods.

Utilizing such equipment, in 1936 a comparison was made of the influence of heat-processing whole kernel corn (with a limited amount of brine in the container) in steam at a temperature of about 280 deg. F. prior to sealing the can, with the heat-processing of the same product by conventional vacuum pack whole grain corn processing methods. A thiamine value of 19.6 International Units per 100 g. of product was obtained by the bioassay method for the samples processed at the higher temperature by the special

technic, while a value of only 12.1 I.U. per 100 g. was obtained for duplicate samples processed by conventional methods. As far as the authors are aware, this experiment was the first direct demonstration of the advantage afforded by the "high-short" processing principle in the retention of thiamine in foods.

Vitamin Determinations

Development of the thiochrome method for estimation of thiamine greatly facilitated not only the evaluation of equipment developed for application of "high-short" processing, but also the collection of quantitative data on the fundamental relationships of time and temperature of processing or the sterilizing value of the thermal process, and thiamine retention, with particular reference to low-acid foods heating by conduction. The development of rapid microbiological methods for determination of other vitamins of the B complex likewise made it possible to include these nutrients in the evaluations of the effects of "high-short" processing. Accordingly, cooperative studies with the American Meat Institute were inaugurated which have been reported by Greenwood and associates[8] and Feaster and associates[9]. These studies, which were undertaken with meat products packed both in thermal death time cans and in commercial sizes of containers, established the influence of various conventional retort processing conditions on the retention of thiamine, niacin, riboflavin and pantothenic acid in typical low-acid conduction-heating products. The "core" effect or gradient between the container wall was clearly demonstrated.

Effects Correlated

The most important finding made in these collaborative studies, however, was that there is a relationship between the sterilizing value of a thermal process for a low-acid conduction-heating product and the extent to which thiamine, one of the most heat-labile vitamins, is retained. The sterilizing value of a process has been defined as the "F_0 value" which has been explained elsewhere[10] and is a numerical measure of the bactericidal effect of the thermal process. Here, it will suffice to state that the same F_0 value may be obtained in the processing of any given low-acid food by the application of widely divergent times and temperatures of processing. Specifically, it was found that when the F_0 value of the process is kept the same, the "high-short" type of process produces the highest thiamine retention, as compared with the thiamine retention obtained in other methods of processing. In Table I are shown data which support this statement: When the efficiency or order of process is kept constant, it will be noted that the best results with respect to thiamine retention were obtained by application of a "high-short" process. These studies also indicated that increasing the process temperature 18 deg. F. for any given process time approximately doubled the rate of thiamine destruction, as could be expected for a first order chemical reaction. Based on the F_0 value, however, this increase in temperature increased the rate of destruction of typical food spoilage bacteria about tenfold. Briefly, all preliminary data collected as to the effect of the "high-short" processing principle on thiamine retention in food indicated that the ratio of the rate of thiamine destruction to the rate of bacterial destruction during "high-short" thermal processing is more favorable to thiamine retention than is the similar ratio existing during conventional methods of canned food sterilization.

"High-Short" Processing Technic With Aseptic Filling

In 1940, a new "high-short" processing technic embodying an aseptic filling procedure was first placed in commercial application[4]. This procedure, previously described by Pilcher and Clark[11], involves heating the food by pumping through a tubular heat-interchanger system maintained at temperatures between 270 deg. and 300 deg. F. Under these conditions, sterilization is effected in a very short time. From the heating section the sterilized food is pumped through a tubular cooling section before being filled into sterile cans and sealed under sterile conditions in a special filling and closing unit. Completion of pilot-line equipment including these principles has permitted direct comparison of the effects of this new processing unit with those of conventional processing technics on retention of thiamine and other vitamins.

Pea, lima bean, green bean and carrot purees and cream style yellow corn were included in these comparisons. For vitamin determination, the contents of six cans each of the "high-short" and conventionally processed products were composited and slurries prepared for thiamine and niacin determination by blending equal weights of product and 0.2N H_2SO_4. Chloroform and toluene were added as preservatives. Thiamine was measured by the U.S.P. XII procedure[12] with certain minor modifications, and niacin was determined by the microbiological assay method of Snell and Wright[13] as modified by Krehl, Strong and Elvehjem[14].

Methods Evaluated

In Table II, the pertinent information regarding heat processing and vitamin values is recorded. Inspection of these data shows that the niacin contents of these vegetable products were not appreciably affected by processing by either the "high-short" or conventional methods. Retentions of 88 to 99 percent for the "high-short" and 87 to 103 percent for the conventional processing methods were observed. This is not surprising since niacin is known to be one of the most heat stable vitamins of the B-complex. Therefore, any losses occurring in the canning of vegetables would most likely result from the solubility of this vitamin in the washing and blanching waters.

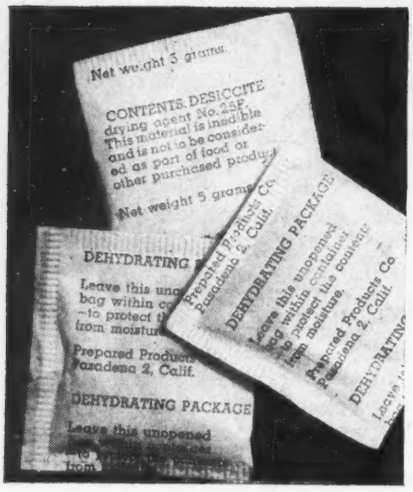
As was to be expected from the data obtained in the earlier studies, the thiamine retentions in those samples processed by the "high-short" technic were considerably higher than the retentions in the conventionally processed samples. This was true in all of the products studied. Samples processed by the specialized technic retained 78 to 98 percent of the thiamine present in the unprocessed material while samples processed by the conventional methods retained only 32 to 79 percent of this thiamine. Hence, it is clear that the "high-short" processing technique affords a means of minimizing thiamine losses during the canning of certain semi-fluid low-acid products.

Effects of Agitating Process

As indicated by Ball[6], the agitation of containers during thermal processing is one means of increasing the rate of heat penetration into the can and shortening the process time required with resultant raising of final food quality. Investigation of the possible applications of agitating processes was also included in process studies carried out in these laboratories.

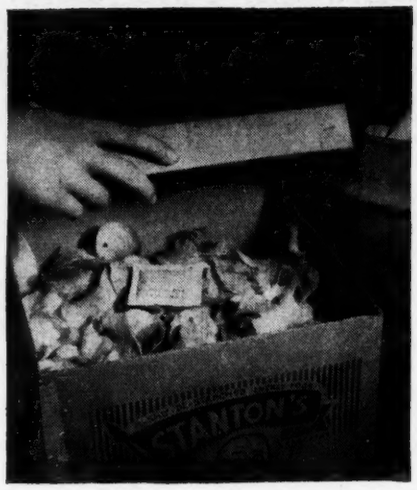
The vacuum packing of certain low-acid vegetables has been practised on a commercial scale by vegetable canners for a number of years. This style differs from the

(*Continued on page* 218)



LEAKPROOF, tea bag-type package of Desiccite carries printed directions for use.

DESICCITE goes into cartons of potato chips at Stanton Saratoga Chip Co., L. A.



RESTAURANT-SIZE, 3-lb. carton of chips needs a 15-g. size packet of Desiccite.

New Desiccant Keeps Quality In, Moisture Out

Small packets or larger containers of desiccant preserve crispness of potato chips and baked goods, prevent hard candy from sticking. Desiccant also helps to dehydrate vegetables and potatoes, with no browning of product

By KENNETH D. KAHN, Los Angeles

FOODS of hygroscopic character need no longer lose much of their quality if a drying agent is used to combat absorption of moisture. One of the newest desiccants suitable for use with food products is Desiccite, a non-lime-base material processed from a naturally occurring mineral by the Filtrol Corp. of Los Angeles.

Dehydrated foods and condiments, hard candies, potato chips, cereals, crisp bakery goods and some pharmaceuticals are especially in need of protection against moisture-vapor, unless they are hermetically or vacuum sealed. Such protection can be gained by introducing the proper amount of desiccant, in a leak-proof container, into the product package.

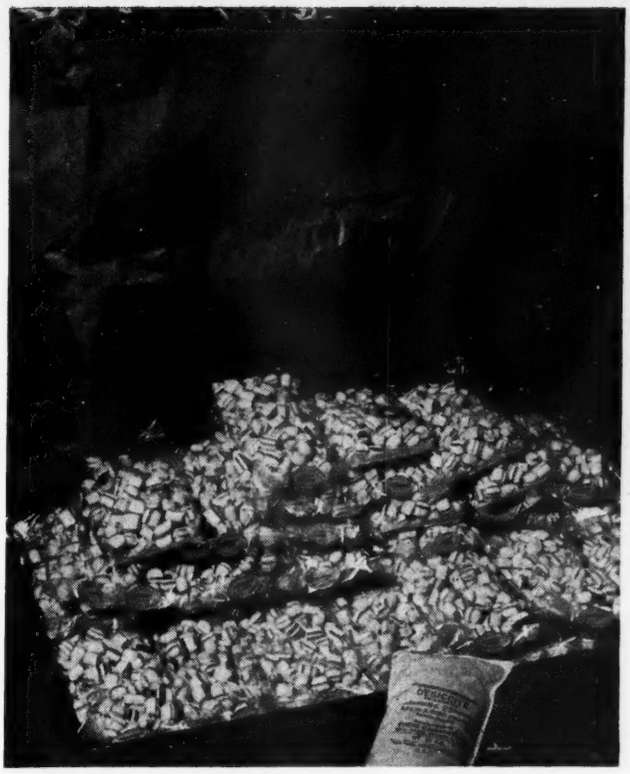
Tests following this principle were made during the war at the Western Regional Research Laboratory in Albany, Calif. Moisture contents of certain vegetables—cabbage, potatoes and carrots, for example—cannot safely be reduced by dehydration to the point where keeping conditions are best, because the products brown or burn. It was found possible to reduce the moisture content of the vegetables from 10 percent to 6 percent, without danger of browning, by including a permeable package of quicklime within an airtight 5-gal. can of the dehydrated vegetable. The end of the war put an end to this research, however, and its results have never been commercially used.

Desiccite contains no lime. Montmorillonite, from which it is prepared, is a hydrous aluminum silicate found naturally, and in almost unlimited quantities, in Arizona and Mississippi. In its natural state the mineral is composed of minute layers of crystal sheets, one slightly separated from the other by water molecules. Numerous patents have been formulated covering both the montmorillonite treatment process and its use.

Quite distinct from other varieties of montmorillonite, which are largely the swelling type, Desiccite (No. 25 and No. 25F) is inert, tasteless, odorless, non-toxic, non-corrosive, non-abrasive and neutral. It adsorbs moisture by physical means alone and will not liquify or soften even under extreme conditions of moisture. Unlike adsorbents which adsorb increasing amounts of moisture as the relative humidity increases, Desiccite adsorbs proportionately more moisture than other adsorbents at lower relative humidities. It has a high apparent density, as compared with other drying agents, and permits packing of 50 percent greater quantity per unit volume, thus increasing the drying capacity. It can be regenerated for re-use by removing it from the container and heating it for 2 to 3 hours at 300 to 350 deg. F.

The minimum percentages of water-vapor which this desiccant will adsorb from the atmosphere of various relative humidities at 80 deg. F. are shown in Table I.

In practice, the amount of desiccant to be used with a given food product must be determined pri-



ALUMINUM FOIL, laminated to kraft paper, provides moisture barrier in a carton containing 12-oz. size package of Desiccite.

PEANUT BRITTLE packed with desiccant showed no loss of flavor, quality or freshness at the end of a 60-day test period.

marily by research, guided by experience and familiarity with the product. The amount used depends upon several factors, such as the optimum moisture content of the product at its desired quality (degree of hydration desired), size of the package, rate of moisture transmission of the container and relative humidity at the point of destination.

Simple to Use

For consumer size food packages, Desiccite is put up in 5-gram, 10-gram and 15-gram packets. These packets are made of heavy weight tea bag paper and are printed in accordance with the U. S. Food and Drug Administration requirements. They are strong and sift-proof. Packets are filled and heat sealed in an automatic machine which will turn out 12,500 packets per hour. These packets are placed in food packages or containers at the same time the container is filled with product. It requires so little effort that no additional employees are needed. For purposes of cost accounting it is figured that the addition of the Desiccite to a food package costs one quarter of a cent per package. The cost of the bag of Desiccite is approximately one cent.

The small wafer-like packets measure 3 in. square and are approximately ⅛ in. in thickness. They can be folded, if necessary, for adaption to certain space requirements. Except in hermetically sealed containers, some moisture inevitably seeps through the closures, breathing past the threads of the screw tops. In bottle goods or screw top containers, the desiccant is placed in the neck of the bottle or near the screw top so that it may adsorb the moisture as it seeps past the closures.

TABLE I—Moisture Adsorption of Desiccite Under Different Relative Humidities.

Percent rel. hum. (80 deg F.)	Percent moisture adsorption	Lbs. H_2O adsorbed per cu. ft.
10	7.9	4.9
20	12.5	7.8
40	17.5	10.8
60	21.4	13.2
80	26.2	16.2

Other Containers Possible

Depending upon the use for which the desiccant is intended, two other types of containers are used for Desiccite. Paper-lined bleached jean cloth bags are intended primarily for use in Government Method II Packaging.* These containers are finding applications, however, in the storage of pharmaceutical base ingredients, bulk candy packaging, and in storage of other package goods. A less expensive package made of paper-backed cloth may be used for most purposes. These larger sizes of Desiccite are available in 6-oz., 12-oz., 24-oz., and 7½-lb. bags and are packed in 22½ gal., 22-gage steel drums, holding about 170 lb. net.

Webril bags of gauze backed paper are being filled and distributed by Kendall Mills Div. of Kendall Co., Walpole, Mass. The small tea bag paper containers and the 1½-oz. and 3-oz. bags are being manufactured by Prepared Products Co., Inc., Pasadena, Calif. These two companies receive the desiccant from the manufacturer, fill and seal the bags, and imprint the F&DA warning on the face of these containers. These Desiccite containers may also be obtained from Filtrol Corp. distributors.

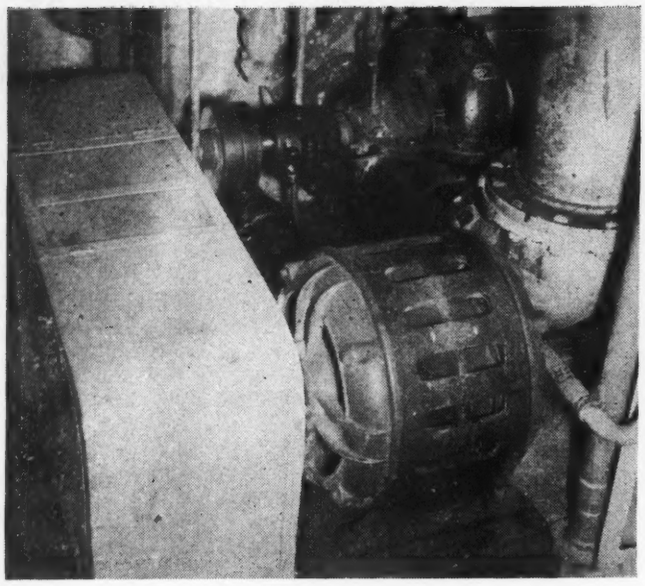
F&DA Attitude

The U. S. Food and Drug Administration states that it has no objection to the use of a desiccant of this type when it is inclosed in a non-sifting tea bag properly labeled to show that it is not a part of the food. Users must also declare on the label the presence of the desiccant. It must be noted, however, that the Food, Drug and Cosmetic Act does not authorize the Administration to give formal approval of this packaging process.

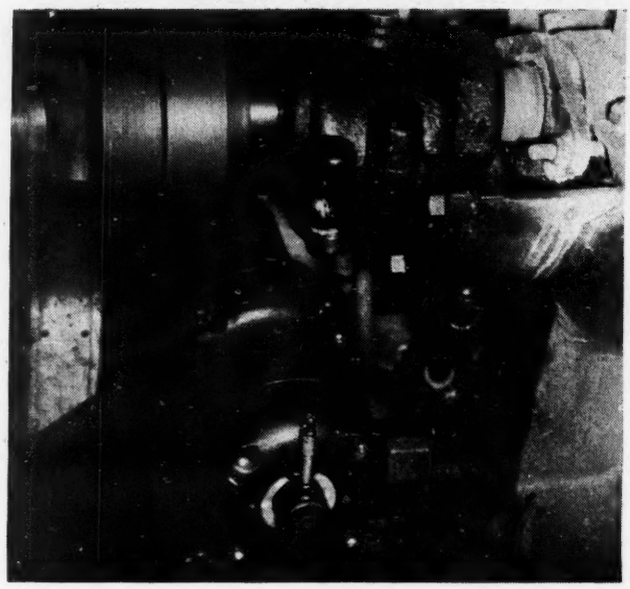
The F&DA adds caution that such a desiccant must be free from poisonous impurities and that any sifting into food contents may result in adulteration. Also, in ab-

(*Continued on page* 224)

*According to Armed Service Specifications AN-D-6c and JAN-D-169.



SEWAGE PUMP, one of the 12x12 Allis-Chalmers L. S. pumps that discharge sewage from Corn Products Refining Co. plant.



GEAR-IN-HEAD MOTOR, operating through a limit switch, controls pump speeds and operates driving screw of float switch.

Automatic Controls Solve

Variable speed drives and electrical contact switches enable pumps to handle

By E. S. STATELER,
Associate Editor
"Food Industries," Chicago

HOW to cope with "flash flood" conditions when operating at capacity production was a serious problem at the Corn Products Refining Co. plant in Kansas City, Mo., until about two years ago.

The sewage disposal system, as installed when the plant was built more than 20 years ago, consists essentially of a 400 cu. ft. capacity sump from which the sewage is discharged into an 18-in. sewer by two Allis-Chalmers 12 in. x 12 in. L. S. pumps individually driven by 40-hp. constant-speed squirrel-cage motors. It was designed to handle water from the condensers, backwash from the water softener, rain water and sewage from washrooms and toilets.

Variable Load

When the plant operates at minimum production rate, the load upon the sewage disposal system is about 2,000 g.p.m. During average operations, and in the absence of excessive rain water, the load is about 5,500 g.p.m. When the plant is operating at maximum capacity, the load is about 8,000 g.p.m. At any time during the day, regardless of the operating rate, there may be a flash increase of as much as 2,500 g.p.m. lasting about 5 min. due to back-washing of filters; or a flash increase when a sudden storm puts an unexpected volume of rain water into the system.

These and other wide variations in pumpages gave rise to operating difficulties. Considerable volume of entrained air was drawn into the pumps when the flash surge ended and when the water level in the sump was insufficient to keep the suction inlet submerged. A period of 15 min. was sometimes necessary to clear the pumps of the entrapped air and permit them to handle the next surge of increased flow.

Possible Solutions

Several possibilities were considered as a solution of the problem: (1) To increase the capacity of the sump and to lower the suction inlets, (2) to change the collars of the existing pumps and add another pump of lower capacity, (3) to install a new pump of sufficient overall capacity to handle peak loads, and (4) to put existing pumps under automatic control to cut in and out of operation as the load upon the system varied.

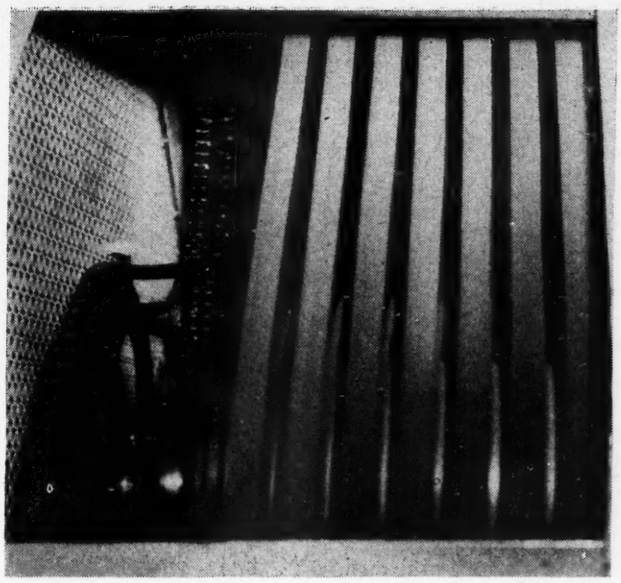
Increasing the sump capacity was not feasible because of space limitations, subsoil conditions and prohibitive cost. Installing a new overall capacity pump would have meant scrapping existing installation and interfering with plant operations at an excessive cost. Even though solution of the problem had been attempted through either of these alternatives, the results would have been doubtful and the cost about twice that of putting in an automatic control.

Automatic Control

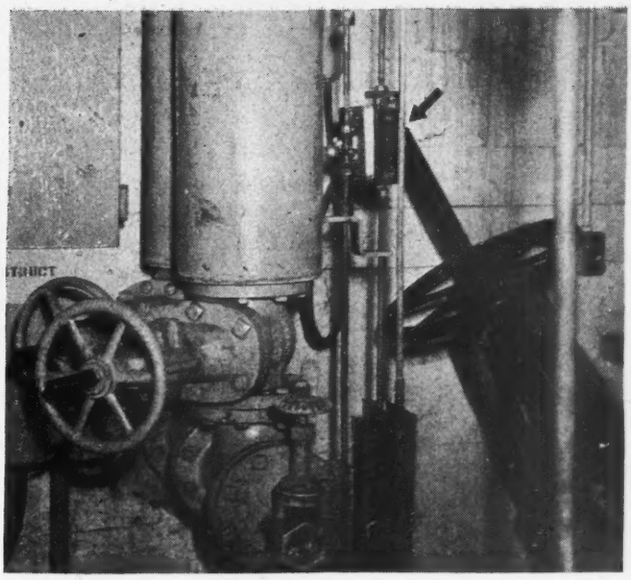
Details of the automatic control hookup were worked out in collaboration with Allis-Chalmers Manufacturing Co. engineers and were decided upon for the following reasons: (1) Cost, (2) could be installed with minimum interference with normal plant operations, and (3) could be retained to handle flood waters and other unpredictable surges which would throw an overload on the new constant-flow installation planned for the plant. The plant enlargement plan will include a new sump system and a large capacity pump to handle a constant flow of sewage under normal operating conditions.

First Step

The first step in putting the pumps under positive control was to fit them with variable speed drives to assure a smooth, con-



TEXROPE DRIVE from 40-hp. motor to L. S. pump. Chain drives between countershaft and motor sheave can be seen at left.



FLOAT SWITCH, connected by chain to float in standpipe, activates electrical controls governing operation of pump motors.

Sewage Pumping Problems

wide variations in flow without air entrapment or flooding disposal system

trolled pumping operation whether one or both pumps are in use on either full or partial capacity.

Step two was the installation of an interconnection between the sump and the pumps, which is actuated by the rise and fall of the water level in the sump. Such a connection cuts the pumps in and out individually or in tandem to handle the constant-flow sewage and the surge loads with the minimum of time lags in the cut-ins and cut-outs. This float device not only actuates the cutting in and out of the motors; it also actuates the controls over the speed of the motors so that they individually and collectively speed up or slow down as the sewage level in the sump rises and falls.

Pump Controls

Each pump was equipped with a complete separate control mechanism, although the installation could have been made to operate both pumps from one pilot control. To have done that would have involved manual control by the operator to bring the pump speeds together before starting the second pump, in addition to having the pump speeds correspond with the speed indicated on the moving part *B*, Fig. 1. Cost of installing individual controls was about the same as for installing one pilot control for both pumps, including the extra countershaft, gear-motor and jaw clutches that would have been needed.

Piping Changes

A third step was to make piping changes with the attachment of a "T" and two pipes to the 18-in. sewer outlet at a point as far as possible from the former pump intakes. They serve as "stand-pipes" for the floats, (23) Fig. 1. Also, this sewer extension outlet was lowered to give the water less fall than the former 318.0 elevation. Further, impellers of greater capacity were fitted in the two sewer pumps which, with the variable speed drives, enable them to operate over the entire range of flow to maintain a predetermined sump water level with a given pumping capacity.

An electrical control system operates the drives and obtains the required operating speed of the pumps, see Fig. 2. Key to the operation of the speed control is in the float-operating, contact-making mechanism—a geared type limit switch (1) Fig. 1. This mechanism, within the limits of the maximum and minimum speeds obtainable, provides an infinite number of operating speeds for the pumps with possible reversal of the movement of the change-speed mechanism at any point of operation. Reversal at any point makes possible the immediate speeding up of the pumps as a surge load is thrown upon the sewage disposal system or the immediate slowing down of the pumps when the peak of the surge load has passed.

Operation

In operation, the moving part *A*, Fig. 1, is pulled over towards moving part *B* by the float chain (14) as the float (15) lowers. Pilot circuit contact is made (11). This contact closes the slowdown relay through time-delay relay (8) connected with a ½-hp. gear-in-head motor (3). This motor operates with an output speed of 9 rpm. through a reversing switch (4) to control the direction of the motor (3) rotation and float switch (moving part *B*) movement. In this way the speed of the pump is slowed down or speeded up as the floats fall or rise in the stand pipe (23) connected with the sump.

Torque Motor

As the torque, on gear-in-head motor (3), reduces the pump speed through the roller chain (19) and (22) and sprockets (17), (18), (20) and (21), it also operates the roller chain and sprocket mechanism (24), (25) to move the float switch

Float Switches Control Pumps for Removal of Sewage From Plant Sump

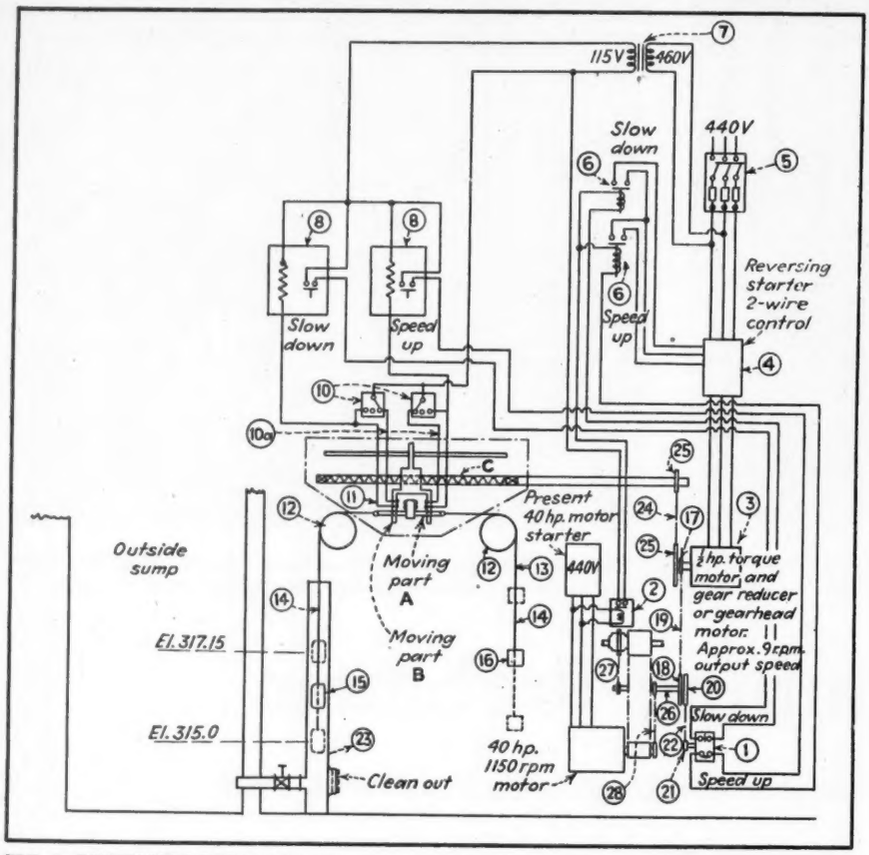


FIG. 1. SCHEMATIC DIAGRAM of float operated controls for each of the two pumps.

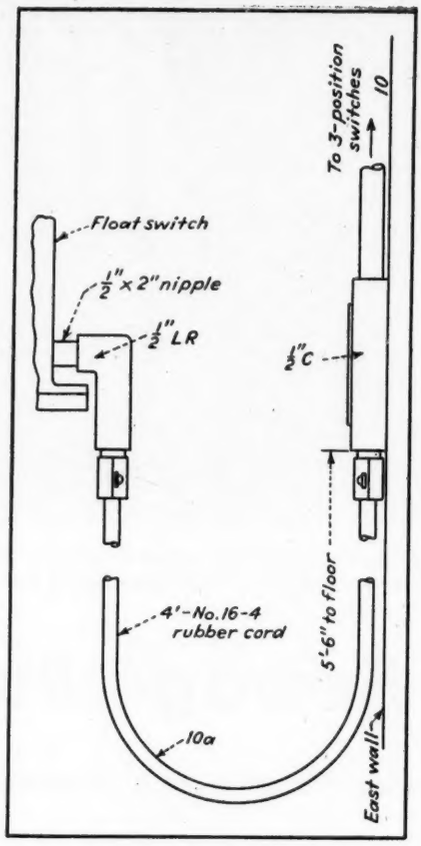


FIG. 2. FLOAT SWITCH wiring diagram.

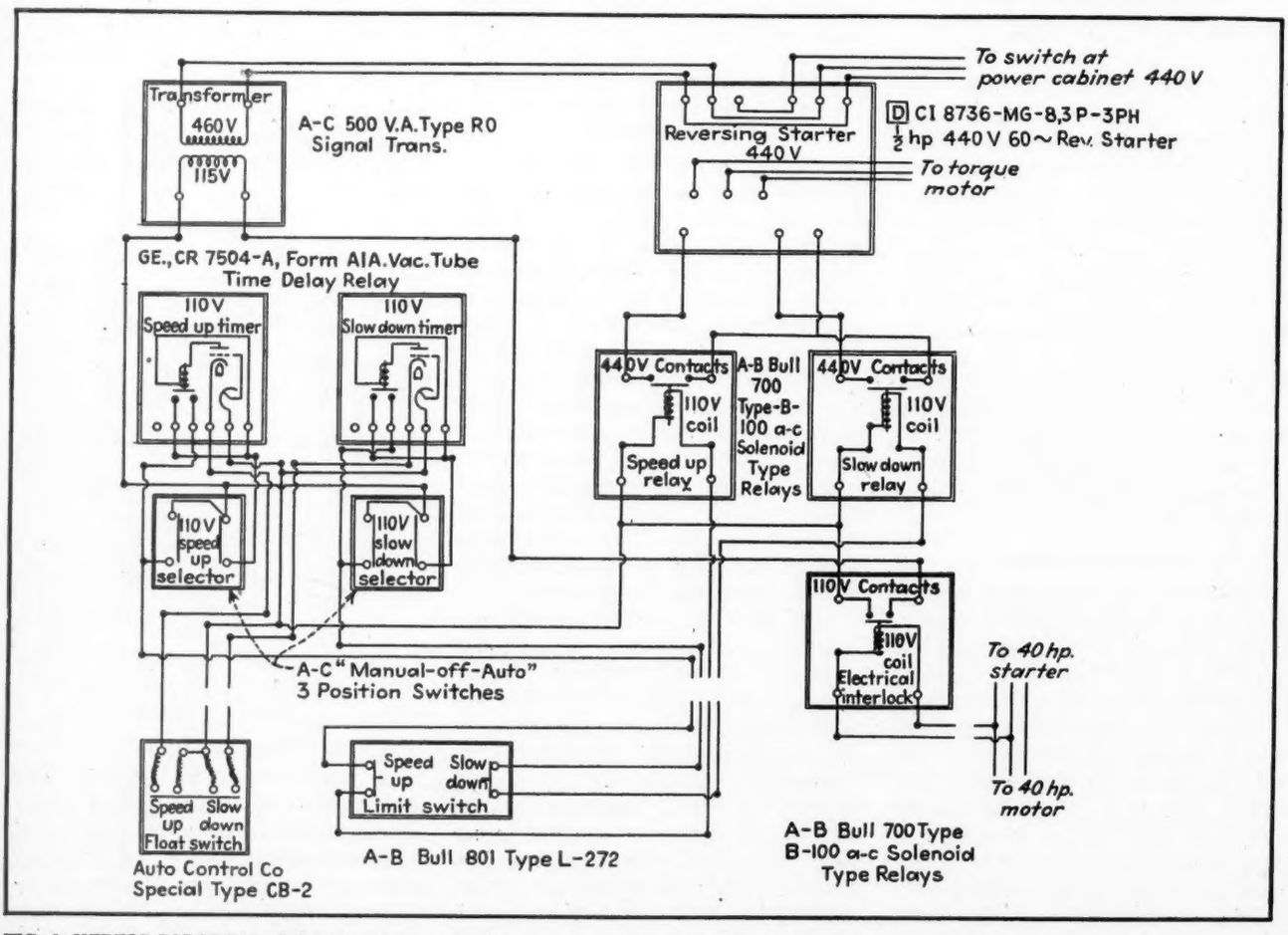

To switch at power cabinet 440 V
Transformer
460 V
115 V
A-C 500 V.A. Type RO Signal Trans.
Reversing Starter 440 V
D CI 8736-MG-8,3 P-3PH ½ hp 440 V 60~ Rev. Starter
To torque motor
GE., CR 7504-A, Form AIA. Vac. Tube Time Delay Relay
110 V Speed up timer
110 V Slow down timer
440 V Contacts
110 V coil
Speed up relay
A-B Bull 700 Type-B-100 a-c Solenoid Type Relays
440 V Contacts
110 V coil
Slow down relay
110 V speed up selector
110 V slow down selector
110 V Contacts
110 V coil
Electrical interlock
To 40 hp. starter
A-C "Manual-off-Auto" 3 Position Switches
Speed up
Slow down
Limit switch
Speed up
Slow down
Float switch
To 40 hp. motor
Auto Control Co Special Type CB-2
A-B Bull 801 Type L-272
A-B Bull 700 Type B-100 a-c Solenoid Type Relays

FIG. 3. WIRING DIAGRAM of electrical control system operating drives and providing an infinite number of pump speeds.

(moving part *B*) upon the driving screw *C*. In that way the pilot circuit contacts are opened and the torque motor (3) is stopped. If the float continues to drop, the pilot circuit contacts will again be closed, the torque motor restarted, and the pump slowed down through the variable speed drive while the float switch is again moved up and the pilot circuit contacts again broken. If the float rises, the direction of movement of the pilot circuit contacts is reversed, and the pump or pumps speed up until the operating rate takes water out of the sump at the rate it comes in.

Time Interval

The distance between the "speed-up" and the "speed-down" contacts allows a time interval. This time interval is that needed for the moving part *A* to travel the distance between the contacts when changing from speed-down to speed-up or vice versa. Moving part *B* is made so that the distance between the speed-up and speed-down contacts can be varied although it is operated on a 20-sec. "make and break" interval to correspond with the setting on the time-delay relay (8).

Time-Delay Relays

The time-delay relays are set for the most desired intervals ranging from 3 to 60 sec. These relays avoid "hunting" when the movement of the sump water level is continuing in one direction, either up or down. Total distance of travel of moving part *B* on the driving screw is at least equivalent to the distance between the lowest and highest float setting—about 26 in. or the distance between elevation 315.0 and 317.15, indicated in Fig. 1. The screw permits a travel of at least 36 in. to allow for some change in float settings. Electrical contact between float switch (11) and 3-position switch (10) is by a flexible rubber-covered cord (10a), of sufficient length to permit full movement of moving part *B*.

Variable Pump Speed

Gear-in-head motor (3), or ½-hp. torque motor and gear reducer, drives both the countershaft of the Vari-Pitch drive (26) and the screw *C* of the contact-making mechanism (11). In this way a given speed of the pump corresponds to a given position of moving part *B* on the driving screw *C*, which in turn corresponds with a particular water level in the sump. This sump water level varies, approximately, only by the distance between the speed-down and speed-up contacts of moving part *B* with allowance for the make and break lag of 20 sec.

Limit Switch

Geared type limit switch (1) protects the variable speed drive between the 40-hp. motor and its respective pump so that the upper and lower limits of speed variation are not exceeded. This limit switch is driven from the countershaft (26) to give protection to the variable speed drive even though the chain (27) between the countershaft and the pump sheave or the chain (28) between the countershaft and the motor sheave should break.

This electrical control system permits operation of both pumps simultaneously, as in the case of normal operation, or of either of the pumps separately during shutdowns or when low volumes of water are discharged from the plant into the sump.

When only one pump is operating, the discharge valve of the second pump is closed and the disconnect switch is opened. To start the second pump, it is only necessary to start its 40-hp. motor, close its disconnect switch and place its 3-position switch (10) in the automatic position. The discharge valve is left closed until the control mechanism of the second pump brings the speed of that pump up or down to the speed of the operating pump or to the speed corresponding to the water level in the sump. Then the discharge valve is opened and the speeds of both pumps automatically slow down to that corresponding to the sump water level with two pumps operating.

Two Pumps Needed

One pump alone operates at 1,028 rpm. at 5,500 g.p.m. capacity with its float at elevation 317.15. Two pumps together operate at 823 rpm. at 5,500 g.p.m. with the floats at elevation 315.5. Both pumps must always be on the line when the plant is in normal operation because each has a normal operating capacity of 2,500 g.p.m.

Check valves in the discharge lines of each pump connecting with the header give protection against pumping through one pump in case its starter should snap out of operating position and take that pump off the line with the other pump operating. That protection was considered advisable in view of the plant operating conditions and the varying loads thrown upon the disposal system by flash surges in sewage volume.

Possible Adjustments

Adjustments to meet different operating conditions can be made in a period of one to two min. by making minor changes in sprocket combinations. Settings can be made to change the pumps from highest to lowest speeds in two min. If later conditions warrant the changing of sprocket sizes, time for shifting from highest to lowest speeds can be cut to one min. Likewise, the time interval can be increased by merely changing sprocket sizes. Also, the system is so arranged that automatic starters for each of the 40-hp. pump motors and motor-operated pump discharge valves can be installed, thereby eliminating the need for manual action to start the second pump unit.

Quick Response

Since the variable speed units and the electrical control systems have been installed, the pumps have been responding readily and quickly to changes in the rate of flow of the water discharging into the sump. Normally, when there is no backwashing of water softeners in the plant, or surge of rain water, the pumps operate at the same speed for periods ranging from 30 to 60 min. In some instances they have operated at the same speed for as long as two hours. They now operate on a time lag of 20 sec. from the time an impulse is received until the speed change is made. Indications are that a time lag of considerably less can be obtained without lessening the effectiveness of the control through "hunting."

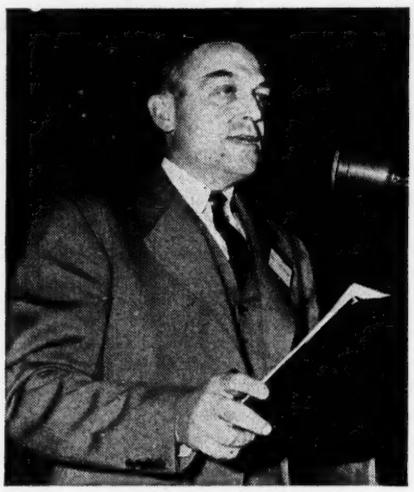
As the system now operates, the sewage discharge volume from the sump is equivalent to the incoming volume—a performance impossible to attain previously. Also, there is now no indication of sewage backup in the drains into the sump or of surges trying to pass air pockets in the line. These benefits are measurable in terms of elimination of production losses caused by sewer drain overflows.

Acknowledgments

Acknowledgment is made to John Schipper and Lee Stalder of Corn Products Refining Co. engineering department and to A. A. Dahms of Allis-Chalmers Manufacturing Co. for their assistance in obtaining the information and drawings embodied in this article.

HAROLD STASSEN . . . "Give the government your specialized food knowledge."

J. A. REILLY . . . "The Super Market Institute's panel offers six proposals."



W. I. DAVIDSON . . . "The immediate problem is preventing starvation this winter."

A. C. NIELSEN . . . "Watch actual consumption, not only trade inventories and sales."

FOOD—

Industry's role in establishing world's

By J. A. J. JONES
Assistant Editor
"Food Industries"

WITH the growing political crisis stemming from this year's hunger in Europe, together with that hunger's humanitarian aspects, the food industry in the United States has awakened to the importance of its status in world affairs. This was apparent at the 39th annual convention of the Grocery Manufacturers of America, in New York, in November.

If the industry has appeared somewhat hesitant in recognizing its major role, it had not far to look for the reason. In the all-out production efforts of the war years and in the readjustments to fit unprecedented conditions since the close of the war, the food operator has had to keep very close to the grindstone.

The industry has by no means abandoned this close contact with the grindstone. But it has assumed the added burden. The efforts of the nation's bakers to economize, in order to save grain, and the action of the brewers and distillers to the same end are only two of many illustrations. There was no less interest, among this wide segment of the food industry, in such speakers as Arthur C. Nielsen—who for the tenth time offered his market analysis to a GMA gathering—but there was far greater interest than heretofore in topics that were worldwide in scope.

A five-point marketing program for grocery manufacturers was advanced by Mr. Nielsen, based on his most recent analysis of the grocery market. Using February-March, 1942 and June-July, 1947 as base points, he found, for instance, that while 33 important food commodities have advanced 79 percent in price, the increase in tonnage has been only 23 percent. If and when there is a cut in spendable income, this 23 percent figure will be important to keep in mind. But this price rise has not had the plausible effect of diverting consumer buying to cheaper, off-quality brands. To the contrary, he found that 27 leading nationally advertised brands have actually increased their share of the market in the four months from February-March to June-July of this year. The gain was from 41.9 to 42.8 percent.

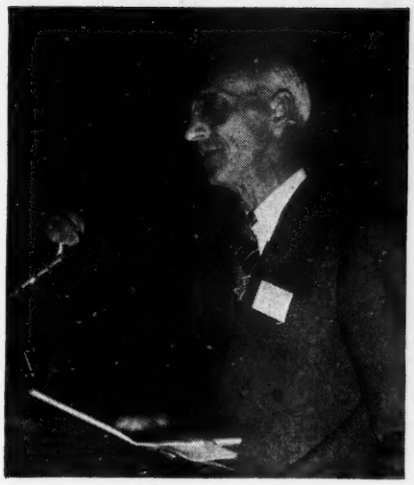
One of the results of price increases has been a reduction in retail inventories. And this reduction in turn results in retail stock shortages, which creates a serious problem for the manufacturer in maintaining his consumer preference, or franchise. In checking three important food commodities, on an average day, it was found that from 53,950 to 99,600 retail stores, which normally handled them, were out of stock.

For those who may minimize the value of the consumer franchise, the analysis pointed up the swift comebacks made by the several major brands that were forced off the market during the war. These comebacks were all the more striking when compared with lower market position of newer, widely promoted commodities in the same class.

The Program

The five-point program outlined by Mr. Nielsen was based upon recognition of the value of the consumer franchise:

1. Make effective use of the increasingly fast turnover of your brands in retail stores.
2. Make a strong and specific effort to get—and to keep—wider retail distribution and more adequate retail stocks.
3. Do more and better work at the point-of-sale. This aspect of distribution is again assuming importance and some unusual opportunities await those manufacturers who recognize this situation and



CLARENCE FRANCIS . . . "What makes us think our democratic system won't prevail."

DON BELDING . . . "The aims of the citizens committee can be reached voluntarily."

T. R. REID . . . "We must put our houses in order by developing human relations."

At Home and Abroad

economic stability is stressed by GMA speakers

act promptly and effectively.

4. Keep your finger on the pulse of consumer demand. Watch actual consumption as well as trade inventories and consumer sales. The latter two alone may often be misleading.

5. Keep your feet on the ground. Trade rumors are apt to fly thick and fast, particularly if there is any indication of a declining market. Check the actual facts, particularly as they relate to consumption.

System Works

Clarence Francis, chairman of the board, General Foods Corp., in discussing the broader aspects of world food supply, asked first that we cast fear aside. "I can't get shaky about our system," he said. "We have a system that works. What makes us think that our system will not prevail against a system that has never succeeded anywhere it has been tried in the world? But we have a job to do. We know that in the Russian satellite countries—those behind the iron curtain—are all the food exports of eastern Europe," Mr. Francis continued. "These were formerly exported to western Europe. We know that western Europe this year experienced the worst crop failure in a hundred years. Add to these the disruption of the normal system of distribution, world soil conditions and a 200,000,000 growth in population, and we must conclude that help must be given."

Broaden Outlook

In Mr. Francis' opinion, these conditions add up to a problem in agriculture and industry second to none that this country has had to face. "In our role as a world power," he said, "I think we have got to live up to our great responsibilties. The time has come when we must broaden our perspective. We can no longer think just in terms of this room or this community or this state or our country. Whether we like it or not, we are the most powerful influence in the world for good." He cited the contributions made by the food industry to the national welfare. These contributions include not only the Nutrition Foundation, but the time and talent contributed through the Advertising Council and other channels. Estimating these contributions at $100,000,000, he offered them as evidence that the industry has dedicated itself to the principles involved in the slogan that "What is good for the country is good for business."

Results of the Grocery Manufacturers Panel, conducted at the recent Super Market Institute convention, were reported by James A. Reilly, vice-president, Colgate-Palmolive-Peet Co. Partial conclusions were reached on at least six

GARDNER COWLES . . . "Continued American economic stability is important."

points, which are here summarized:

1. Manufacturers should help to offset the cost of tie-in advertising. 2. Cash discounts should not be discontinued. 3. Sufficient space should be left on packages for quick and efficient price marking. 4. Specified conditions should be adhered to in cases of combination sales and use of premiums. 5. Distributors should be reimbursed for the handling of paper coupons. 6. Manufacturers should re-analyze their damaged goods policies to see that they fit into the conditions that exist today.

Don Belding, chairman of the board, Foote, Cone & Belding, and vice-chairman of the Citizens Food Committee, outlined the committee's work as of mid-November. His talk clearly illustrated what the industry is doing to gain the extra 100,000,000 bu. of wheat it is agreed will be needed for shipment to Europe above the regular allotment. The bakers will make by far the greatest contribution. Their pro-

(*Continued on page* 228)

ROQUEFORT-TYPE CHEESES depend upon the action of *Penicillium roqueforti* mold for their sharp, peppery flavor. Methods for making these European cheeses from cow's milk are now permanently established here and production is sufficient to meet our needs.

Cheese Quality Improvement Influenced By Technology

Control and use of fermentation processes; clarification, homogenization and pasteurization of milk and the time-schedule procedure contribute to improvements in quality, and tend to simplify the cheese making process

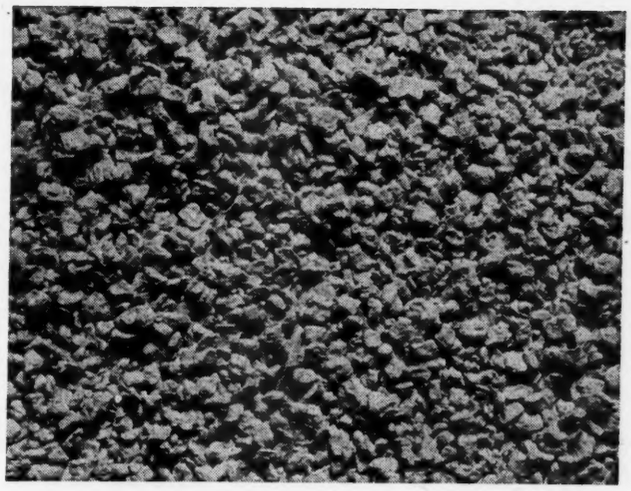
By GEORGE P. SANDERS, Chemist, Division of Dairy Research Laboratories, Bureau of Dairy Industry, Agricultural Research Administration, USDA, Washington, D. C.

DEVELOPMENTS in the research laboratories of the Bureau of Dairy Industry and at various agricultural experiment stations have contributed greatly to the improvement in the quality of cheese made in this country during the last 40 years. Among the developments described in this article are: The manufacture of blue and soft cheeses from homogenized cows' milk or cream; the clarification of milk for Swiss cheese; the making of American Cheddar from pasteurized milk; an improved phosphatase test for pasteurization of cheese; and the curing of natural Cheddar in consumer-size units.

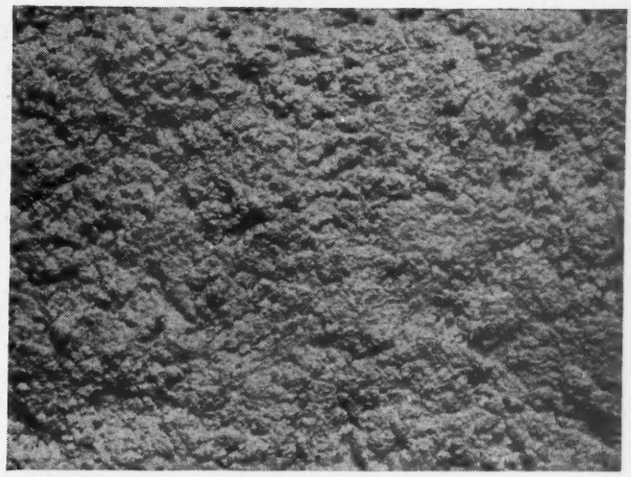
Experimental work, beginning as early as 1905, demonstrated that Camembert and cows' milk Roquefort-type cheeses can be made successfully in this country. The organisms responsible for the ripening of these two cheeses were identified and used in cheesemaking by Charles Thom, J. N. Currie, Alice Evans, and K. J. Matheson of these laboratories between 1906 and 1918. In 1914, Doctor Currie showed that the action of *Penicillium roqueforti* mold in forming sharply-flavored fatty acids, including caproic, caprylic and capric acids, is largely responsible for the sharp, peppery flavor of Roquefort cheese. The methods developed for making these European mold-ripened cheeses from cows' milk are now permanently established in domestic factories in successful production in quantities to meet our needs.

Additional developments in making blue cheese from cows' milk have been made recently at the Iowa and Minnesota experiment stations. The work at the Iowa Agricultural Experiment Station included homogenization of the milk, or the cream, to subdivide the fat and thus induce faster development of flavor by lipase action on the fat and produce a whiter color and a mellower body; and heating the milk under partial vacuum, known as Vacreation. Investigations at the Minnesota Agricultural Experiment Station included curing the cheese in underground caves.

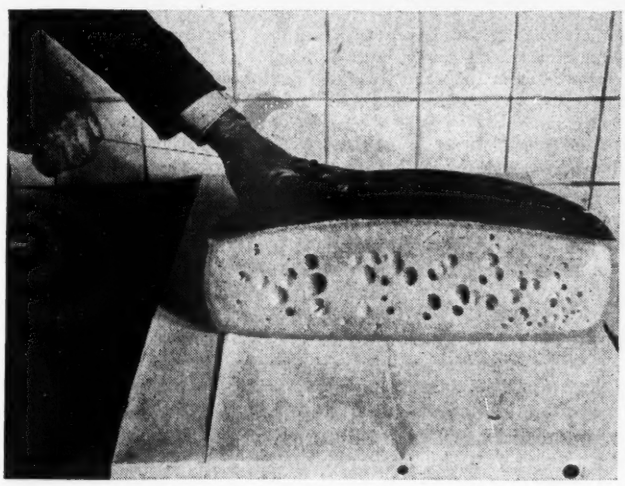
Manufacturers have recently added another improvement, bleaching the cream before cheesemaking, to add to the desirable whiteness of the curd in the finished cheese.



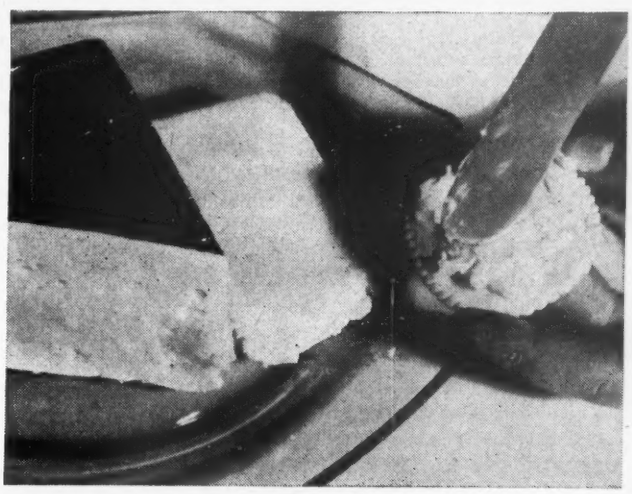
NEW COTTAGE CHEESE developed at the Bureau of Dairy Industry has firm, large grains and an excellent flavor.



OLDER TYPE is fine-grained and soft. Due to higher acid content, it does not keep as well as the new type.



SWISS CHEESE. Introduction of clarification has resulted in a remarkable improvement in elasticity of curd and eye formation.



BEL PAESE, a soft, mild-flavored cheese, as good in every respect as that made in Italy, was developed in the Bureau's laboratories.

Soft Cheeses

Cream and Neufchatel. Experiments leading to the successful development of a method for manufacturing Neufchatel cheese and cream cheese from pasteurized milk were made here during the first World War. Later, homogenization of the cream used in making cream cheese was introduced at the Experiment Station at Geneva, New York, in a procedure known as the Geneva method. Homogenization of the standardized, pasteurized cream with nonfat dry milk added, together with a small proportion of gelatin or agar as a stabilizer, and a lactic starter, shortened the making process and yielded cream cheese with a mildly acid flavor, a smooth, mellow body, and good keeping quality.

Cottage. In 1931, H. L. Wilson and C. S. Trimble of these laboratories developed an improved procedure for making a low-acid rennet-type cottage cheese. Made from pasteurized milk, with the use of rennet and starter and with a slow, gradual development of acidity, this improved type of cheese has a superior, large-grained body, excellent flavor, and good keeping quality. It is made extensively in all parts of the country.

Bel Paese. A soft, mild-flavored cheese of the Italian Bel Paese type, as good in every respect as that made in Italy, was developed by Robert Farrar in these laboratories in 1939. Its successful production depended upon extensive studies of the method used in Italy and of the characteristics of the imported cheese, plus the use of pasteurization and the application of laboratory technical-control methods.

More than a billion pounds of cheese are produced annually in the United States. The principal types, with approximate production in pounds in 1946, are:

American (including Cheddar)	801,000,000
Soft skim-milk cheeses	285,000,000
Italian varieties	75,000,000
Cream cheese	65,600,000
Swiss	55,000,000
Brick and Muenster	17,700,000
Neufchatel	7,200,000
Limburger	9,500,000
Blue	12,600,000
Other types	52,800,000

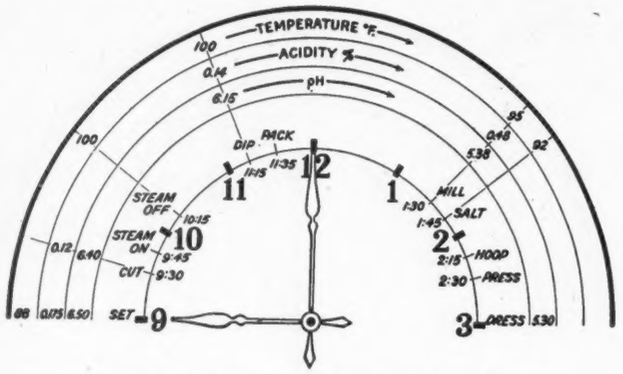
Bureau of Agricultural Economic Figures.

Swiss Cheese

Researchers in Europe discovered, in 1906, that centrifuging the milk improved the eye formation in Emmenthal-type (Swiss) cheese. It was the work done by the Bureau of Dairy Industry, however, in experiments conducted by K. J. Matheson and his associates beginning at the time of the first World War, that firmly established the usefulness of the clarifying process in making this cheese. Clarification alters the flexibility and elasticity of the cheese curd and produces a remarkable improvement in the formation of the eyes. The eyes are fewer in number, larger, rounder, and shinier,—characteristics that are considered very important.

Pure Cultures. Between 1920 and 1925, J. M. Sherman and his associates in the U. S. Department of Agriculture isolated and identified an organism that produces the characteristic eyes and

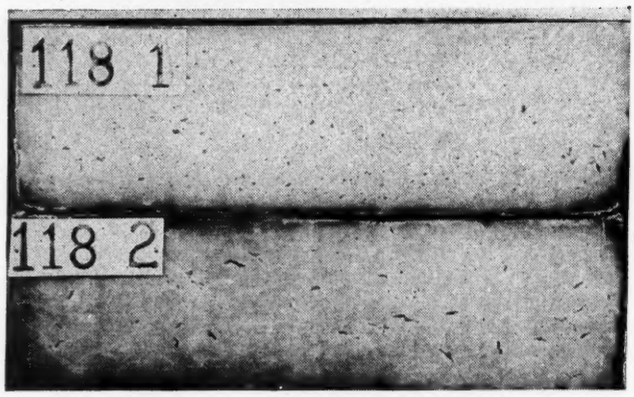
Cheddar Cheese Manufacture: Pasteurized vs. Raw, Gassy Milk



Time-Schedule Chart For Making Cheddar Cheese

Milk is first pasteurized by heating to 162 deg. F. and holding for 15 seconds. It is then cooled to between 86 and 88 deg. F., starter is added and the milk allowed to ripen for one hr. at this temperature.

WHEN using the pasteurized milk time-schedule method the cheesemaker can time each step in the process and make his work more systematic. This method has been introduced in 160 factories in Ark., Ill., Ind., Ky., Mich., Minn., Mo., Ohio and Tenn.



Cheddar Cheese Made From Low-Grade, Gassy Milk

		Bacterial count/ml.	Methylene blue	Cheese score
118	1.....Raw	4,200,000	2½ hrs.	86.5
118	2.....Pasteurized	12,500	6¼ hrs.	91.2

PASTEURIZATION improves Cheddar cheese even when made from low-grade, gassy milk. It eliminates the harmful effects of gas-producing bacteria. Rate of ripening cannot be increased successfully and safely, however, unless high grade milk is used.

contributes to the flavor in Swiss cheese. It resembles somewhat other eye-forming bacteria studied earlier by European scientists. Later, other experimenters here established the role of two other types of bacteria essential in starters for this cheese—a lactobacillus and a streptococcus—and introduced the pure-culture method for preparing and using the starters.

Practically all the Swiss cheese factories in the United States have adopted the clarifying process and the pure-culture method. The results have been so beneficial that, according to estimates made of quality in factories, the average quality of the cheese has been raised by at least one grade.

Cheddar Cheese

The rapid increase in the use of the pasteurizing process for milk used in cheese making was one of the most important developments in cheesemaking during World War II.

The early work on pasteurization dealt almost entirely with the prevention of disease. The classical disease-control work of Theobald Smith of the Department of Agriculture, in 1899, showed that the organism causing tuberculosis can be destroyed in milk by heating at 140 deg. F. for 20 min., and in cream by heating at that temperature for a somewhat longer time. In 1909, John R. Mohler and his associates demonstrated that this organism can stay alive for weeks in cheese, and suggested that, "If it be possible to use pasteurized milk in the manufacture of cheese without injuring the product, a simple solution of the problem is offered to the cheese manufacturer in the process known as pasteurization."

Experimenters in Europe and Canada tried, between 1898 and 1907, to make cheese from pasteurized milk, but the resulting cheese was not satisfactory. The first well-controlled experiments that showed definite promise were reported in 1912 by J. L. Sammis and A. T. Bruhn, in work done at the Wisconsin Agricultural Experiment Station in cooperation with the U. S. Department of Agriculture. But the heat treatment diminished the rennet-coagulating property of the milk and the cheesemaking process was complicated by the necessity of adding acid to the pasteurized milk to restore the coagulating property.

Meanwhile, pasteurizing equipment was being improved, especially in regard to the control of the temperature. Reports by the Wisconsin station in 1915 indicated that high-quality cheese could be made from pasteurized milk without the use of added acid, and that pasteurization of the milk eliminated the harmful effects of gas-producing bacteria and improved the flavor of the cheese.

Second Grade Eliminated

Reports on the successful use of pasteurization in cheesemaking in New Zealand, published in 1916 and 1923, pointed out that the production of second-grade cheese was almost entirely eliminated by pasteurizing the milk, and that "Pasteurization of milk for cheese making has been in all respects an unqualified success." Recent reports state that in 1943 there were about 300 Cheddar-type factories in New Zealand, nearly all of them making excellent cheese from pasteurized milk.

Results of experimental work at the Wisconsin Agricultural Experiment station and at the Experiment Stations at Davis, California, and Geneva, New York, between 1925 and 1930, showed consistent improvement in the quality of Cheddar cheese resulting from pasteurization of the milk.

Specialists in this Bureau began to investigate the problem in several factories in southern states in 1927 and in Washington and Oregon in 1935, and have since continued the project more intensively both in the laboratory and in commercial plants. They likewise found that the quality of the cheese was improved by pasteurization. They discovered also that the quality depended greatly upon the control of the acid-forming fermentation that occurs during the making process —that is, not only upon the amount of acid developed at a given stage in the process, but especially upon the rate of acid development.

Time Schedule

Accordingly, a time schedule was developed for making the cheese from pasteurized milk, based on the use of a uniformly active starter in such quantity as to control the acidity within prescribed limits at definite periods in the making process. In applying in factories the method developed in the laboratory, they found not only that it improved the cheese and made it

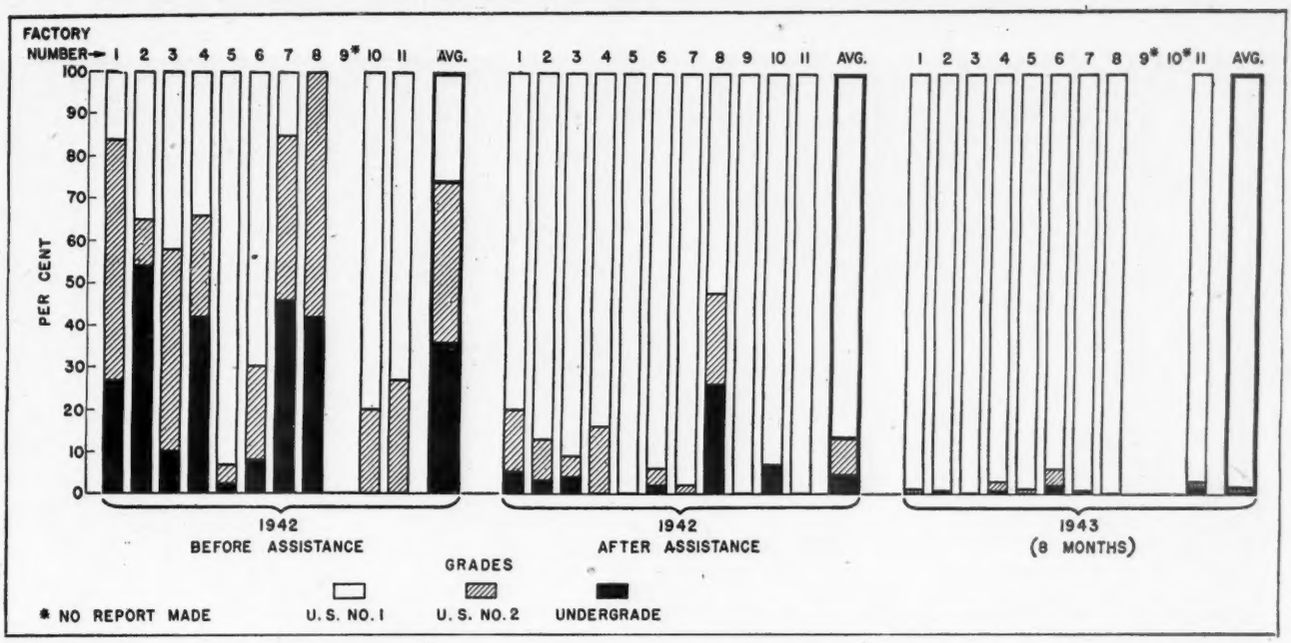


FIG. 1. CHEESE of each grade made in Minnesota factories before and after introduction of pasteurized milk time-schedule method.

more uniform from day to day, but also that the time-schedule procedure simplified the making process.

Table I shows the time schedule and other details of the method pointing out the conditions under which the best cheese was made.

When the government began to purchase Cheddar cheese in large quantities in 1942 for Lend-Lease and for the armed forces, a relatively high percentage of the cheese offered was not of U. S. No. 1 grade. This Bureau began a more intensive program of introducing the pasteurized-milk time-schedule method by providing assistance in about 160 factories in 9 states.

Improved Quality

Fig. 1 is an illustrative graph showing the improvement in quality made in 11 factories in Minnesota. These results are typical of the improvement made in all areas where the method was introduced. The use of the Bureau's method resulted in the greatest improvement in those factories in which the proportion of No. 1 cheese had been relatively low, and some improvement in quality and uniformity was obtained even in those factories in which the proportion of No. 1 cheese had been fairly high.

The use of this method has spread rapidly to other factories. The resulting cheese proved to be of uniformly high quality, stood up well in shipping and storage, and met very well the requirements for use abroad and for the armed forces.

It should be understood that pasteurization cannot be used as a substitute for good quality of milk. The milk must be of good quality in order to make uniformly high-quality cheese, even though the milk is pasteurized.

Curing Cheddar Cheese

Results of experiments with pasteurized-milk cheese at the Texas Agricultural Experiment Station indicated that "short cure" Cheddar cheese of satisfactory quality could be produced within 4 to 8 weeks by ripening for 2 weeks at 45 deg. F. and for the rest of the time at 60 deg.

Earlier results at the Pennsylvania Agricultural Experiment Station, with a small number of lots of cheese, indicated that the rate of protein break-down in Cheddar cheese could be increased 40 to 100 percent by raising the curing temperature from 45 to 63 deg. F., and that the maximum flavor score was reached more quickly at the higher temperature.

Many cheesemakers have hesitated to adopt pasteurization because it has been stated that Cheddar cheese made from pasteurized milk does not ripen so rapidly or cure so well as cheese made from raw milk, and does not develop the same flavor, nor enough of the characteristic flavor to satisfy some consumers.

Rapid Curing

Large-scale experiments were conducted in these laboratories to investigate methods for rapidly curing Cheddar cheese made from pasteurized milk and for improving its flavor. Most of the experiments were made with high-grade milk, but milks of varying quality were also used in some of the experiments. More than 260 lots of cheese were cured at different temperatures from 40 to 70 deg. F.

The results showed that cheese made from pasteurized high-grade milk—and made by the time schedule method—ripened faster and developed more and better flavor when cured at a temperature as high as 60 deg. F. than when cured at 50 deg. or lower. A curing temperature of 70 deg. for more than a few weeks, was too high. The cheese made from pasteurized high-grade milk and cured at as high as 60 deg. F. was as fully ripened in 3 to 4 months as the control cheese cured at 50 deg. or lower for 6 months, and was scored higher than the cheese cured at 50 deg.

Poor Quality Milk

When milk of poor quality was used, however, the defects resulting from inferior milk became more pronounced in the cheese cured at the higher temperatures. Moreover, the quality of the cheese was much poorer when the low-grade milk was not pasteurized than when it was pasteurized.

The studies showed that, while the rate of ripening could be increased successfully and safely when the milk used was of a high grade and was effectively pasteurized, and when the cheese was made according to the time-schedule method, an increased curing temperature—above 50 deg. F. or as high as 60 deg.—produced the best results only when the cheese was made properly from pasteurized milk of a high grade. Pasteur-

Valve-Vented Cans Provide Complete Protection for Natural Cheddar Cheese

CANNED CHEESE. Cheese curd, pressed in the form and size of the can, is inserted into the can, which is then sealed. The one-way valve permits escape of CO_2, yet prevents entrance of air. Vacuum packing and insertion of gas-absorbing chemical are also practiced.

ization completely eliminated gassiness in the cheese.

Shelf Curing

So-called "shelf curing"—careful selection of cheese of high quality and curing it under well controlled conditions at a temperature higher than usual—has been practiced by some manufacturers for a number of years. The curing procedure mentioned above, however, involves specifically not only the curing conditions but several additional factors—i.e., high-quality milk, pasteurization at a controlled temperature, a uniformly active starter, following strictly the time-schedule method of manufacture, and, where faster development of flavor is desired, curing the cheese under carefully controlled conditions of temperature, humidity, and cleanliness at a temperature higher than that normally used in the past for most raw-milk cheese.

Clarification of Milk

Workers at several State Agricultural Experiment Stations have demonstrated that clarification is beneficial in making Cheddar cheese, improving the body and flavor and helping to prevent gassiness, pinholes, and sponginess in the curd. This discovery was reported first in 1895 by S. M. Babcock and later by H. L. Russell at the Wisconsin Experiment Station; it has been verified since then by workers at Cornell University, the Minnesota and Iowa Experiment Stations, and at the Department of Agriculture of Canada.

In Cheddar cheese, however, the improvement made by clarification has been less outstanding than that made in Swiss cheese, and the process has not been adopted nearly as widely.

Cheese of Other Types

Brick. A detailed study of the method of manufacturing brick cheese, by the U. S. Department of Agriculture in cooperation with the Wisconsin Agricultural Experiment Station, was published in 1935. The method described at that time, with some modifications introduced later by manufacturers, has helped greatly to standardize the making process and yields cheese of improved quality and uniformity.

Cheese For Grating. Increased flavor has been attained in Italian-type Romano cheese, in work done at the Experiment Station at Davis, California, by using rennet paste rather than extract.

Workers at the Pennsylvania Experiment Station have developed a sharp cheese by using a mixture of pasteurized homogenized cream and raw skim milk. During curing the cheese was rubbed with mineral oil and black pepper. The experimenters stated that the lipase enzyme in the skim milk accelerated the production of highly flavored fatty acids from the finely-divided fat in the homogenized cream, and that the process yielded a sharp, piquant flavor in a comparatively short ripening period. It is said to be suitable for grating.

Liederkranz. A soft cheese known as Liederkranz, resembling mild Limburger in body and aroma and ripened partially by bacteria (and possibly also yeasts and molds) that are propagated on the surface, is manufactured in a factory at Van Wert, Ohio. It is one of the few cheeses of strictly American origin, and has become very popular. It is made from pasteurized milk.

Limburger. Limburger cheese, a soft, surface-ripened variety with a distinctive flavor and aroma, originated in Belgium and is being made in numerous factories in Wisconsin. The identities of

TABLE I—Time Schedule and Other Details For Making 350 Lots of U. S. No. 1 Grade Pasteurized-Milk Cheese.

Operation	Time from setting hr.:min.	Temperature Deg. F.	Acidity Percent	pH value
Starter added ..	0:00	86–88	....	6.55
Rennet added ..	1:00	88	0.175	6.50
Cutting ...	1:30	.....	0.117	6.40
Steam on.	1:45	.....	....	...
Steam off.	2:15	100–102	....	...
Dipping ..	3:15	100–102	0.149	6.15
Packing ..	3:35	100	0.194	...
Milling ...	5:30	95	0.479	5.38
Salting ...	5:45	92	....	...
Hooping ..	6:15	89	....	...
Pressing ..	6:30	.....	....	...
Dressing .	7:00	.....	....	5.30

The milk was pasteurized at 162 deg. F. for 15 sec.; 0.5 to 1.0 percent of starter was used; the average acidity of the starter was 0.77 percent; one hr. was allowed for ripening after addition of starter; and 3 oz. of rennet and 3 lb. of salt were used for each 1,000 lb. of milk.

organisms said to be responsible for the characteristic surface ripening were established by research at the New York (Geneva) Experiment Station. Manufacturers in Wisconsin, and also researchers at the Geneva Station, have demonstrated that the control of gassiness and the uniformity of body and flavor of this cheese can be promoted by giving special attention to the quality of the milk and by pasteurizing the milk.

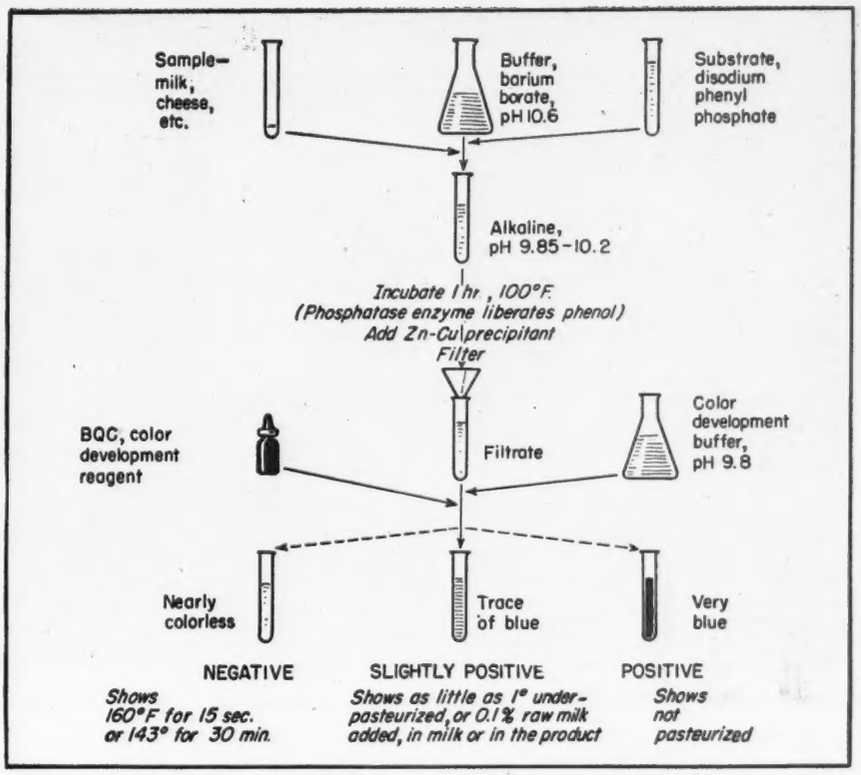
Process Cheese. Most of the developments in process cheese have been made under patents by commercial firms, and by the Wisconsin Agricultural Experiment Station. The Wisconsin Station has recently also developed a new method for making a dairy spread.

Test for Pasteurization

A practical method for testing Cheddar cheese, to determine whether or not the milk used in making it had been pasteurized, was developed in 1945-46 by this Bureau (Sanders and Sager test). It is an improved modification of the phosphatase test commonly used in testing milk to determine the adequacy of pasteurization (Scharer test). The test depends upon the fact that all normal milk contains the enzyme phosphatase, and that this milk enzyme is destroyed by heating at a temperature a few degrees higher than that required to destroy the most resistant of the pathogenic organisms that may occur in milk. The test provides an accurate, quantitative measure of the phosphatase activity present in the milk or in the product made from it, and hence is a reliable index of the effectiveness of the heat treatment.

Later work, in 1946-47, involving further improvement of the test for milk and cheese and its application to the other common dairy products, showed the test to be capable of detecting a decrease of less than 1 deg. F. in the pasteurizing temperature, or as little as 1 lb. of raw milk in 2,000 lb. of properly pasteurized milk. The enzyme is concentrated in cream, and the test is capable of detecting 1 lb. of raw cream added to 5,000 lb. of pasteurized cream.

The test has recently been applied to and found reliable on other dairy products, including Swiss, other hard cheeses, process cheese and cheese spreads, cottage and other soft, unripened cheeses, cheese whey, milk, chocolate milk, cream, buttermilk, fermented milk drinks, ice cream, sherbet, butter and, (less sensitively) goats' milk.



STEPS in the improved phosphatase test for pasteurization of milk products. It has recently been applied to many types of cheeses, and many other products made from milk.

Since several states have recently passed regulations requiring that cheese sold be made from pasteurized milk, or that the cheese be cured for a definite period of time before retail sale, the development of a reliable test for pasteurization is of great importance to the cheese industry and to the public. It is now possible for cheese manufacturers and public-health officials to cooperate with federal regulatory agencies in setting up standards of identity, including pasteurization of the milk used in making nearly all kinds of cheese as a public-health safeguard. The promulgation of such standards is now under consideration by regulatory agencies.

Dehydration of Hard Cheese

In 1943 these laboratories announced the development of a new method for dehydrating American Cheddar and other varieties of hard cheese, which was more direct than the spray-drying procedures in commercial use and which was designed to make it possible to release some of the spray-drying equipment that was in great demand for preparing other foods.

The urgent need for shipping space for all foods early in the war focused the attention of research workers on the possibility of dehydrating and compressing cheese to reduce its weight and volume. At that time, commercial firms were unable to dehydrate cheese of normal fat content by direct methods, because the heat caused the fat to melt and form a gummy mass that could not be dried.

By the new process, natural cheese of normal fat content, or made from milk with only part of the fat removed, is first shredded thinly without macerating the particles, and partially dried immediately in rapidly-moving air at room temperature, thus sealing up the fat in numerous case-hardened particles of curd. It is then finally dried in a tunnel or chamber drier with a gradual increase in temperature and with circulation of air. The moisture content is reduced from about 36 percent to as low as three percent if desired, with an increase in the percentage of fat, in the case of whole-milk cheese, to 50 percent. The reduction in weight is about one-third. The dried flakes can be packaged loose or, to save space, compressed into rectangular blocks and coated with wax; in that form there is a saving of 40 to 50 percent in shipping or storage space.

The direct-drying method requires much less expense for equipment than does the spray-drying method. During the war it was used in preparing about 6,000,000 lb. of dry, compressed cheese soup, containing nearly 20 percent cheese,

(*Continued on page* 212)

RENTED TRUCKS were financed on a basis of 2 percent of the value of the load. An employee profit sharing plan has made possible . . .

Truck Charges Geared

Unusual accounting method reveals costs of distribution have been cut 37½ percent by the adoption of an employee profit sharing plan. The new system actually makes the drivers partners in the business and results in a much greater volume of distribution in considerably less time

WHEN commercial trucks were impossible to buy during the war, Holleb & Co., wholesale grocers, Chicago, hired trucks for which they paid on the basis of 2 percent of the selling price of the goods delivered. Since then, by the adoption of a company trust fund and the use of company-owned trucks, the delivery cost has been reduced to 1¼ percent.

Unusual Method

This method of paying for motor truck deliveries on the basis of the selling price of the goods delivered is most unusual. Normally the cost of delivery has little or nothing to do with the selling price of the goods handled. Instead the cost of delivery is more nearly dependent upon the character of the load itself, such as the pounds or tons that can be delivered within the limits of the working day at straight time, the ease or difficulty of delivery, and the area and frequency of delivery.

For example, it costs no more to deliver a 100-lb. bag of sugar, the selling price of which is 10 cents per pound, than it does to deliver a 100-lb. bag of coffee with a selling price of 50 cents per pound. Yet on the basis of selling price, the payment for delivering coffee would be five times that charged for sugar.

Has Advantages

However, the payment of delivery costs, based on a fixed, definite percentage of the selling price of the goods delivered, has certain advantages to the grocery wholesaler. For one thing, he bases other expense items, such as selling commissions, handling charges, etc., on a percentage of the dollar of sales. In addition, the wholesaler feels he can afford to pay more for the delivery of coffee than of sugar, beans or flour because there is more profit for him in the coffee.

Of course, the ultimate aim of the wholesaler is to deliver his goods within the prescribed or chosen selling area at a minimum expense in dollars. Whether he uses his own or hired trucks, the cost is ultimately converted into a percentage of sales, which is but another way of expressing the selling price of the goods delivered.

With company-owned trucks, the various items of expense such as truck depreciation, garage rent, fuel, oil and tires, mechanical repairs, painting and lettering, licenses and drivers' wages are paid as such when incurred. Then at the end of the month the total of such items is divided into the total value of the goods sold in the same period to obtain the percentage of delivery cost to sales.

However, when a truck renter agrees to make the same deliveries for a percentage of the selling price of the goods, he takes a big chance of operating at a loss unless he knows from prior experience the average value of the loads to be de-

. . . COMPANY OWNED trucks that do the job at a cost of 1¼ percent of the load's value.

To Load's Value

livered. Any violent downward fluctuation can mean a loss to the truck renter.

Others Use It

Nevertheless, Holleb's unusual method of contracting for automotive distribution has gained some popularity in wholesale grocery deliveries. This is especially the case in Chicago, where several other large grocery wholesalers prefer not to use their own trucks, but to contract for their distribution on a basis of percentage of sales value.

During the war Holleb & Co. maintained eight of its own trucks and hired seven trucks from the Fill Cartage Co. Three of the seven trucks were hired on a weekly basis and four on the basis of 2 percent of the total value of the load. All seven were paid 8 cents per hundredweight for pick-ups.

Own Fleet

Now that trucks are again available for purchase, Holleb & Co. is operating a fleet of 15 trucks of its own. This fleet is made up of one White, five Diamond-Ts and nine Dodges, ranging in load capacity from 3½ to 7½ tons. No tractor-trailer combinations are included in the fleet.

Holleb & Co. sells canned vegetables, fruits, meats, and dried fruits, sugar, teas, coffees, flour, and bottled goods such as catchup, vinegar, etc. Soft drinks or produce are not handled.

The food items are delivered to independent retail grocers only, in Chicago and within a radius of 150 miles. The limits of the delivery area extend to Fort Atkinson, Wis., on the north; to Michigan City, Ind., on the south; and to Streator, Ill., on the west.

Cost Cut

At present the company's delivery cost, with its own fleet of 15 trucks, has been reduced to 1¼ percent of sales. This has been accomplished principally through the introduction of the company's Employees' Profit Sharing Trust.

In short, the Holleb Trust is a fund into which 10 percent of the company's profits for a fiscal year are donated to be prorated among all the eligible employees, including the truck drivers. An employee is eligible to participate in payments from the fund after one year of continuous service. Payments are made on the basis of the length of service and the amount of salary earned during the fiscal period.

This profit sharing plan—which will be described more fully in a subsequent issue of FOOD INDUSTRIES as it applies to the company's truck drivers—has really made the drivers partners in the business. This in turn has resulted in a much higher driver production, a greater volume of deliveries in less time than before the plan was put into effect. The company has also benefited, since the present cartage or distribution costs are 1¼ percent of net sales as compared with the 2 percent previously paid to the Fill Cartage Co.

The reduction of ¾ of 1 percent of net sales is actually a saving of 37½ percent of the former cost of delivery. With rising costs in both truck material costs and drivers' wages, a saving in automotive distribution expense of 37½ percent is most unusual and highly creditable, if not phenomenal. Over a long period of time, the small saving of ¾ percent of net sales will represent a large saving in dollars and cents.

Painted Panels

Another unusual feature of the Holleb fleet is the continuance of the policy of using hand-painted truck sides instead of those employing decalcomanias. In all, the company uses twelve different truck-side designs, of which two, one applying to sliced green beans and one to tomato juice, are pictured in the accompanying illustrations.

Each of the side designs shows in the foreground a facsimile of a can of the product covered. In the background are shown some of the product in the fresh state, such as tomatoes and green beans. All of the side is in bright natural colors that attract attention.

Each panel costs $175. The same type of hand-painted sides were used on the lined trucks rented during the war. However, the cost of the panel painting was paid direct and not included in the leasing rate for the trucks.

Open Tops

Another feature of the construction of the Holleb trucks is the use of open tops with canvas or tarpaulin covers. Usually wholesale grocery truck bodies are of the panel type with fixed closed tops. However, the Holleb company states that open-tops are used because they are lighter in weight and afford greater comfort to the drivers in the hot summer, when the tops are opened up by rolling back the covers.

The base color of the trucks is red. The front of the body, the cab, the frame and the motor hood are all red. The fenders are black.

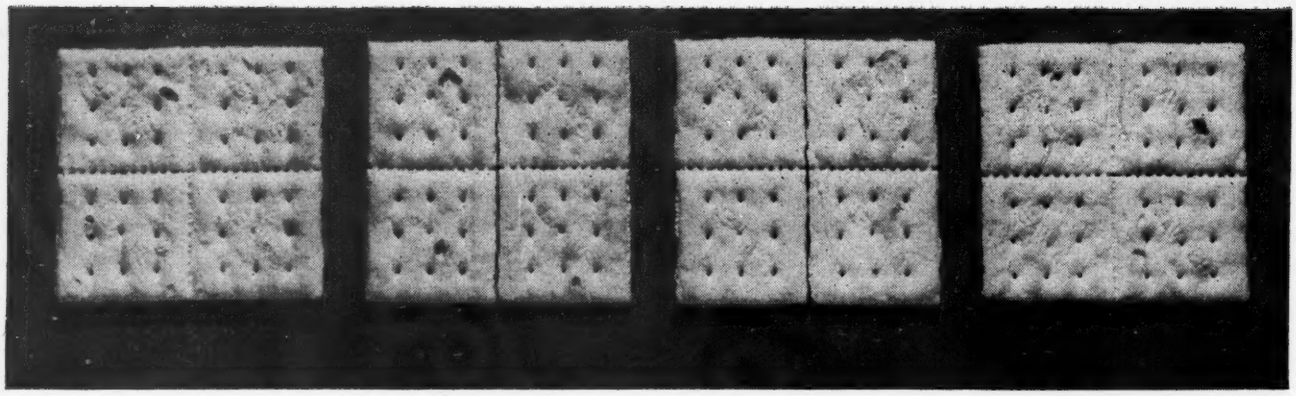


FIG 1(a). GOOD flavor, pleasing appearance and low density are typical of crackers with normal pH (7.6 in this case).

Lactic Fermentation and Trace

Abnormal increase in pH during baking and low quality in finished crackers

By JAN MICKA, Research Department
United Biscuit Co. of America, Chicago, Ill.

EFFECTS of trace metals and nonpathogenic bacteria upon product quality and uniformity are making food manufacturers and technologists increasingly conscious of their importance. Results of recent studies by the author indicate that these factors cannot be ignored even by soda cracker manufacturers whose finished product is generally classed among the simplest of processed foods.

Although it is well known in cracker production that there are variations in quality from one day to another and even in the same day, no fundamental change has been made in soda cracker manufacture during the past several decades. Some plant operators regard Monday as the most troublesome day with the least variations occurring at the end of the week.

Why this is so has not previously been satisfactorily explained, probably because very little published data are available on basic principles underlying soda cracker fermentation and making. Unfortunately, the majority of technical men in this field rely on oral information which may be unreliable. Also, each cracker plant operator has his own idea of what is a good cracker and what are the best methods of fermentation and baking. For these reasons and because there is no satisfactory method for making them on a laboratory or pilot plant scale to study the various factors involved, the manufacture of soda crackers appears to be largely empirical and their variations uncontrolable.

In face of these handicaps, the author undertook a study of the factors that enter into the behavior of the dough during fermentation and in the oven to determine as specifically as possible the nature of variations and what causes them.

There was no difficulty in showing that commercial batches (made to contain from 1000 to 1200 lb. of flour) vary from one to another. Most of these variations have not and cannot be observed during dough fermentation. They appear during the baking. Some of these variations center around the pH, undoubtedly a factor of primary importance, because a good cracker can be made only at certain pH ranges in the sponge, in the dough and in the finished cracker. Preliminary studies showed that some of the crackers had wide variations in pH after baking although all the doughs had practically the same pH at the dough-brake before baking. This developed the question, "What causes these wide variations in pH in the ovens?"

The influence of pH and fermentation temperature on soda cracker quality and uniformity was studied for five weeks. Among the contributing factors studied were: 1. The pH increase during baking, 2. effect of flour bacteria, 3. interaction between metal ions and proteins, 4. effect of sodium bicarbonate and 5. effect of trace iron. Particular attention was given to results obtained on Mondays and Fridays; Tables I and II and Charts 1 and 2.

Experimental Technic

For the pH determinations: one part by weight of the dough was mixed with two parts by weight of water; one part by weight of the baked cracker was mixed with four parts by weight of water.

Three to five minutes were allowed for hydration and equalization of the pH throughout the mixture.

Determinations of pH were made with a Model G Beckman pH meter equipped with laboratory and external electrodes. External electrodes are especially suitable for soda crackers ranging from pH 8.0 to 9.3.

Since the studies were made in a commercial bakery and under usual operation conditions, the data obtained are considered representative for all soda crackers made under the same and similar conditions. The sponges when set were found to have a reasonably uniform temperature of about 22 deg. C. and a pH of about 6.0. After 20-hr. fermentation, they showed a relatively wide variation in both pH and temperature at the remix. At that stage, the range of pH in the sponge for a good cracker is quite wide—from 4.2 to 5.0. At the remix, at least 0.5 percent sodium bicarbonate should be used to de-

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Dr. Micka has concentrated on study of hidden factors in cracker and cookie baking which affect production practice and finished product quality. He believes that these factors in cracker baking need further study.

Previous article by him, "Using Sugar to Best Advantage Under Rationing," was published in June and July, 1943, Food Industries.—The Editors.

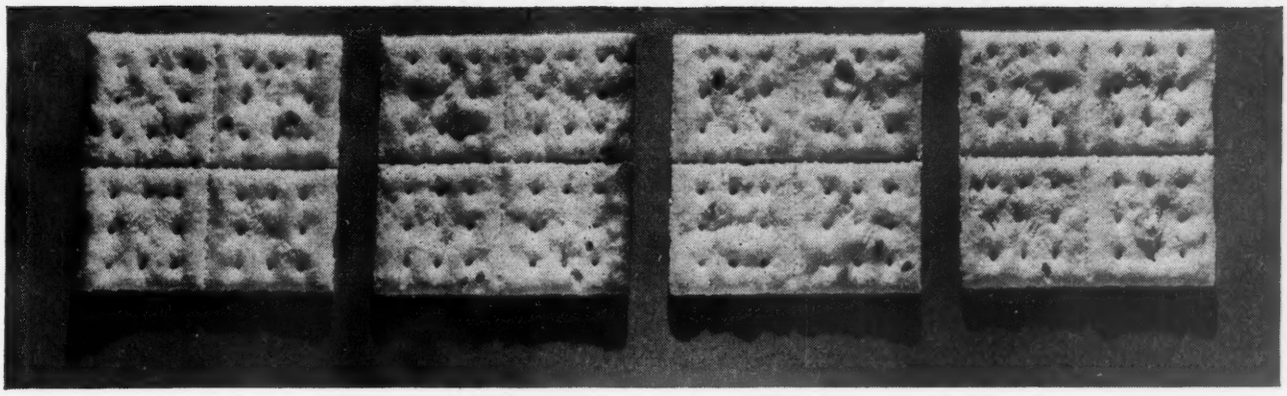

FIG. 1(b). SOAPY, mealy flavor, dull or scorched appearance and high density result when pH is abnormal (8.9 in this case).

Iron Affect Cracker Quality

are tied in with high trace iron and low lactic bacteria content of doughs

velop flavor quantitatively as well as qualitatively[1].

In the dough stage, after the remix, the range of the pH was relatively narrow. When the dough was mixed, the pH was approximately 6.8. During the 5-hr. fermentation, the pH decreased very slightly and, as the acidity increased, the range of pH widened (Tables I & II). In most cases, however, the pH of the doughs at the brake was within reasonable limits and a relatively uniform pH was expected in the baked cracker. These studies showed that this assumption is not the case. Data in Tables I & II show that doughs of exactly the same pH (e.g. 6.8) before baking result in baked crackers with a wide range in pH, (7.2 to 9.3). A study of this change indicates that there are two kinds of increase in pH during baking; a *normal* increase up to 1.2 with 0.8 as a general average and an *abnormal* increase of from 1.2 to 2.5.

It was found that crackers with a normal pH increase during baking are good in flavor, pleasing in appearance and light in weight. And, that a cracker with an abnormal pH increase during baking is soapy and mealy in flavor, lacks spring and is high in density. These crackers are characterized by an "off-odor" during baking, by taking on color or browning very rapidly and by scorching easily.

Absence of a satisfactory explanation for these changes in pH encouraged a focus of this study upon

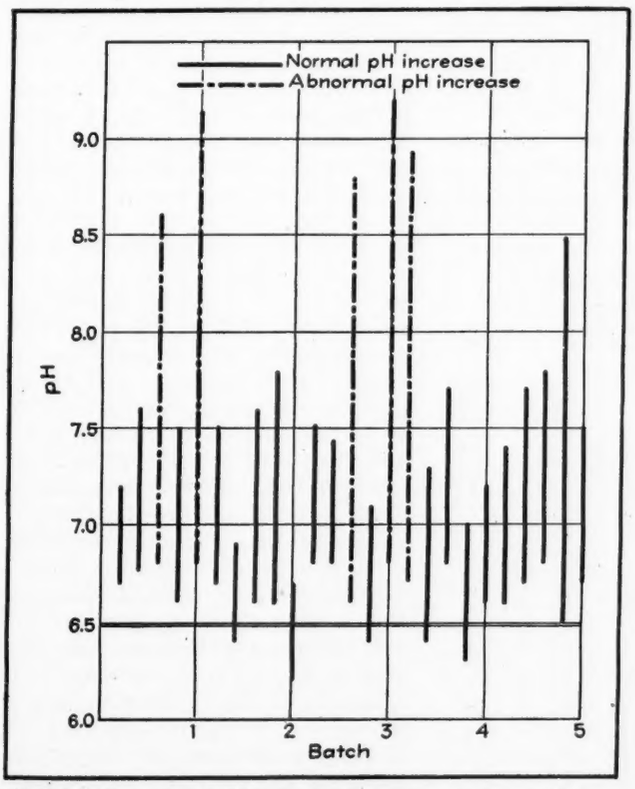

CHART 1. Normal and Abnormal pH Increase During Baking on Mondays.

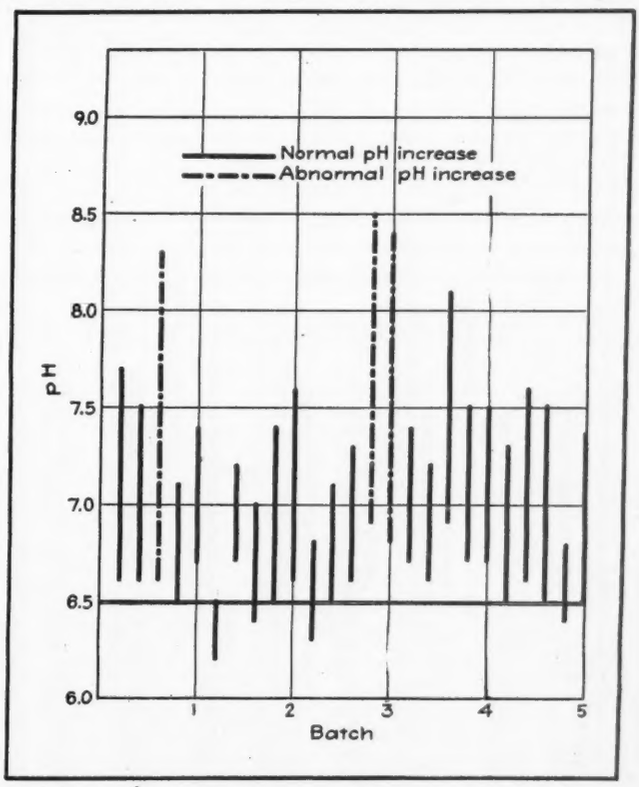

CHART 2. Normal and Abnormal pH Increase During Baking on Fridays.

Dough Films, Iron of Troughs, Are Factors in Cracker Quality

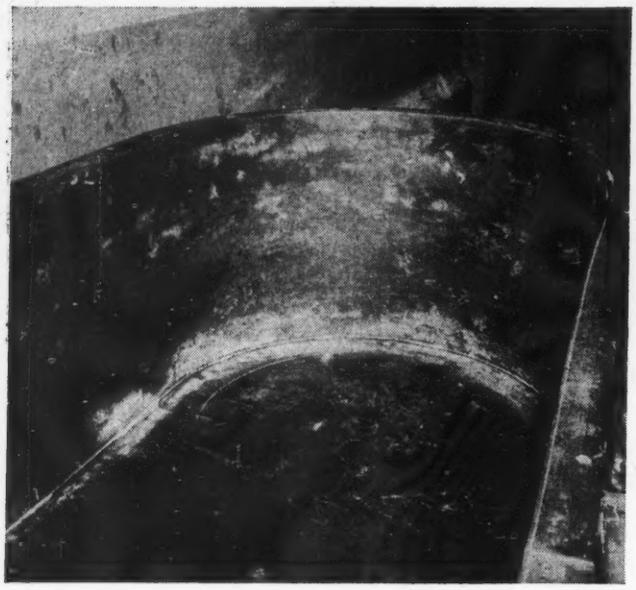

FIG. 2. FILMS of dough (white areas) on inner surface of trough contain lactic acid bacteria. Circular marking on bottom surface indicates scraping by spindle stirrer.

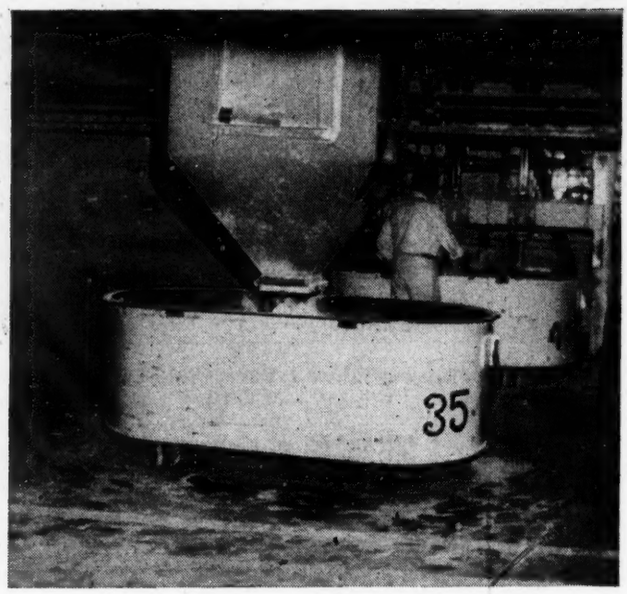

FIG. 3. INGREDIENTS for each cracker dough are weighed or metered, mixed and fermented in an individual trough of approximately 1500-lb. capacity and identified by number.

the effect of the presence of flour bacteria and metal-protein ions on the quality of soda crackers, during both fermentation and baking.

Effect of Flour Bacteria

Good soda crackers can be made using 2 lb. (0.2 percent) of compressed yeast per 1000 lb. of flour. This percentage is about 1/10 of that used in bread making. In some cases, as little as 0.1 percent yeast is used based on weight of flour used. In that respect soda cracker fermentation is like that of sour rye bread doughs where bacterial fermentation has a vital rôle.

The function of flour bacteria or "culture" has not been well understood by the cracker industry, although thorough cleaning of the troughs by scraping, washing with soap and soda or greasing is considered detrimental to fermentation and quality of the finished product. This observation does not imply that the use of "dirty" troughs is desirable but rather that the cleaning should be done in such a way that a thin film of the dough, which adheres tenaciously to the sides and the bottom of the trough, (Fig. 2), is not removed. In effect, that thin film functions as a culture.

Preliminary bacteriological tests of this film of dough, taken just before the sponges were set and after the troughs had stood 20 hr. after emptying, showed the presence of lactic acid bacteria, in counts ranging from 1,200 to 100,000 per one gram. The lactic acid bacteria were predominantly "rod-shaped" of the genus Lactobacillus (*L. bulgaricus, L. acidophilus* and *L. casei*) and some cocci of the genus *Diplococcus* and *Streptococcus lactis*, (*Family IX, Lactobacteriaceae* Orla Jensen[2]). Although the genus Lactobacillus is found principally in dairy products, it is also found in grains[3]. These bacteria produce principally lactic acid from sugars but some strains also produce acetic and propionic acid as well as carbon dioxide and alcohol.[2] However, the amount of volatile acids is negligible (0.014 to 0.019 percent) and is not responsible for abnormal pH increase during baking of the cracker. In soda cracker fermentation lactic acid bacteria act as seed bacteria and contribute to the acidity, pH and flavor of the finished product. This was proved by the use of a new trough or one which was sterilized, Table III. The development of acidity during sponge fermentation is retarded and the pH decreases only from 6.0 to 5.2 and in some cases only to 5.5. The crackers baked from such sponges lack natural fermentation flavor, are flat and "raw and floury" in eating quality and consequently require a lower dosage of sodium bicarbonate for neutralization in the dough stage.[1] To make up for this deficiency of bacteria, some operators add 0.2 to 0.5 percent of old sponge or "buffer." This is also added when the troughs have been idle and the bacteria on the dough films have lost their vitality by drying.

Because there is inadequate or

TABLE I—pH and Temperature in Soda Cracker Doughs and Baked Cracker.

Date	Batch No.	Sponge Set Temp. °C	Sponge Set pH	Sponge at Remix Temp. °C	Sponge at Remix pH	Dough Set Temp. °C	Dough Set pH	Dough at the Brake Temp. °C	Dough at the Brake pH	Cracker pH
	1	22.2	6.0	28.8	4.6	28.9	6.8	29.5	6.7	7.2
Monday	2	22.0	6.0	28.6	4.7	28.3	6.9	29.1	6.8	7.6
1st week	3	22.0	5.9	28.3	4.6	28.6	6.9	29.4	6.8	8.6*
	4	21.8	6.1	27.8	4.8	28.4	6.8	29.2	6.6	7.5
	5	21.7	6.0	28.5	4.9	29.0	6.9	29.8	6.8	9.1*
	1	22.3	5.9	27.8	5.0	28.8	6.9	29.7	6.7	7.5
Monday	2	22.0	6.1	29.1	4.9	29.0	6.7	30.2	6.4	6.9
2nd week	3	21.6	6.1	27.5	4.8	28.4	6.8	29.2	6.6	7.6
	4	21.6	6.0	27.8	5.0	28.8	6.8	29.3	6.6	7.8
	5	21.8	6.0	28.3	5.0	29.2	6.4	30.1	6.2	6.7
	1	21.7	6.0	27.8	5.2	28.1	6.9	29.1	6.8	7.5
Monday	2	21.7	6.0	27.8	4.7	28.3	6.9	28.9	6.8	7.4
3rd week	3	21.9	5.9	27.7	4.7	28.7	6.8	29.6	6.6	8.8*
	4	22.1	6.1	28.2	4.6	28.6	6.7	29.3	6.4	7.1
	5	22.2	6.1	28.4	4.7	28.5	6.9	28.9	6.8	9.2*
	1	22.2	5.9	28.3	4.6	27.8	6.8	28.7	6.7	8.9*
Monday	2	21.9	5.9	28.4	4.3	28.3	6.7	29.1	6.4	7.3
4th week	3	21.7	5.9	28.3	4.5	27.8	6.9	28.5	6.8	7.7
	4	21.7	6.0	27.8	4.7	28.1	6.6	29.1	6.3	7.0
	5	22.0	6.0	27.8	4.4	27.9	6.9	28.7	6.6	7.2
	1	21.6	6.1	27.8	4.8	28.4	6.8	29.2	6.6	7.4
Monday	2	21.8	6.1	27.8	4.8	28.3	6.8	28.9	6.7	7.7
5th week	3	22.0	5.9	28.2	4.7	28.4	6.6	29.1	6.8	7.8
	4	21.9	5.9	28.4	5.3	27.8	6.7	28.4	6.5	8.3*
	5	21.8	5.9	28.7	4.7	28.0	6.9	28.6	6.7	7.5

*Abnormal pH rise.

Characteristics of Good Cracker Sponges Are Well Defined

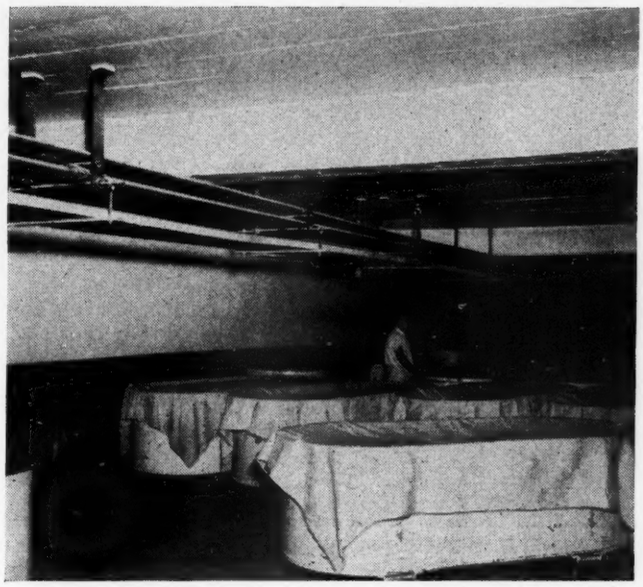

FIG. 4. SPONGES, during their 20-hr. fermentation in a 27-deg. C. room, normally increase in acidity from about pH 6.0 to pH 5.0 and in temperature from about 22.0 deg. C. to 28.0 deg. C.

FIG. 5. CRACKER sponges are relatively stiff in consistency and contain the percentage of dough ingredients essential to good fermentation and flavor development.

no control at all of microbiological conditions of the fermentation troughs, these studies indicate that flour bacteria are the primary factor causing variations from one dough to another and in determining the quality of the finished product. Standardization of bacterial inoculum is considered essential and should be attained before other variables are investigated.

Metal Ions and Proteins

Present in soda cracker fermentation is an abundance of metal cations such as sodium, calcium, magnesium and iron. These metal ions react with protein and amino acids, forming metal-protein complex ions on the alkaline side of the isoelectric point, or they may act as activators of many enzyme reactions[4, 5]. Sodium is introduced at the dough stage as salt, sodium chloride, and as sodium bicarbonate. Salt is added in the quantities of 10 to 12.5 lb. per 1000 lb. of flour. This addition is equivalent to 1.0 to 1.25 percent of the flour. This percentage is one-half of that usually used in bread baking and is too low to check the enzymatic and bacterial activity in fermentation. Sodium bicarbonate is added in quantities of 5 to 7 lb. (0.5 to 0.7 percent) per 1000 lb. of flour. Calcium and magnesium ions are present in the water which is usually added to the sponge in the amounts of 290 to 320 lb. per 600 to 700 lb. of the sponge flour (1000 lb. of flour is the total batch). Iron ions are derived chiefly through the use of iron troughs for mixing doughs.

In the past, the chemical change due to the conversion of sodium bicarbonate into normal carbonate was considered to be the main factor responsible for the pH increase during baking and for the variations of pH in the finished cracker[5, 7]. However, pH in "Dough Set" and pH in "Dough at the Brake" (Tables I and II) show that there is no "free" sodium bicarbonate present which can react in this manner. The determination of the volatile acids indicates that the amount of these acids is negligible (0.014 to 0.019 percent) and consequently not responsible for the pH increase during baking. Our explanation of this pH increase is in the dipolar structure of proteins and amino acids[4] which react with bases in alkaline solutions and with acids in acid solutions[8]. If only flour and water are mixed and baked to make water crackers or cracker meal the pH of the dough (6.0) is lowered only to pH 5.8 in the baked product. However, if sodium bicarbonate is added after 20 hr. of sponge fermentation in such quantities that the pH of the dough at the brake is 6.5 or higher, there is a possibility of an interaction of sodium ion or other cations present in the dough with protein and amino acids causing an abnormal pH increase during baking. This reaction can be catalyzed by iron as will be explained later. A pH of 6.5 in the dough at the brake can be considered to be criti-

TABLE II—pH and Temperature in Soda Cracker Doughs and Baked Cracker.

Date	Batch No.	Sponge at		Sponge at Remix		Dough Set		Dough at the Brake		Cracker pH
		Temp. °C	pH	Temp. °C	pH	Temp. °C	pH	Temp. °C	pH	
Friday 1st week	1	21.8	6.1	27.2	4.7	28.3	6.7	29.4	6.6	7.7
	2	21.9	6.0	27.0	4.8	28.2	6.8	29.4	6.6	7.5
	3	21.8	6.1	27.8	5.1	28.4	6.7	29.5	6.6	8.2*
	4	22.0	5.9	28.1	4.6	28.5	6.7	29.7	6.5	7.1
	5	22.2	6.1	28.3	4.5	28.6	6.8	29.6	6.7	7.4
Friday 2nd week	1	22.0	5.9	28.3	4.8	29.4	6.4	30.5	6.2	6.5
	2	22.1	5.9	28.0	4.6	28.7	6.8	29.6	6.7	7.2
	3	22.1	6.0	27.6	4.5	28.5	6.6	29.7	6.4	7.0
	4	21.9	6.1	27.6	4.9	28.3	6.7	29.5	6.5	7.4
	5	21.8	6.1	27.4	4.5	28.3	6.7	29.4	6.6	7.6
Friday 3rd week	1	22.2	5.9	28.6	4.6	28.9	6.5	30.3	6.3	6.8
	2	21.8	6.0	28.4	4.7	28.8	6.7	29.6	6.5	7.1
	3	21.8	6.0	27.8	4.7	28.4	6.7	29.4	6.6	7.3
	4	21.9	6.0	27.2	5.5	27.8	7.0	28.5	6.9	8.5*
	5	22.1	5.9	28.1	5.4	28.3	6.9	29.2	6.8	8.4*
Friday 4th week	1	22.1	6.0	28.2	4.8	28.5	6.8	29.4	6.7	7.4
	2	22.0	5.9	27.8	4.8	28.3	6.7	29.2	6.6	7.2
	3	21.8	5.9	27.6	4.6	28.2	6.9	28.9	6.9	8.1
	4	22.2	5.9	28.1	4.8	28.6	6.8	29.5	6.7	7.5
	5	22.1	6.0	28.0	4.9	28.7	6.9	29.4	6.7	7.5
Friday 5th week	1	21.7	6.0	27.7	4.7	28.0	6.7	29.2	6.5	7.3
	2	21.9	6.0	27.8	4.6	28.1	6.8	29.2	6.6	7.6
	3	21.9	6.1	28.3	4.6	28.2	6.8	29.4	6.6	7.5
	4	21.8	5.9	28.6	4.4	28.4	6.5	29.6	6.4	6.8
	5	21.8	5.9	28.5	4.4	28.4	6.6	29.4	6.5	7.2

*Abnormal pH rise.

Increase in pH Often Occurs With Crackers of Poor Quality

FIG. 6. REMAINDER of ingredients, mainly flour, salt and soda, are added in the remix and doughs are fermented about 5 hr. with little change in pH and temperature. All mixing is by spindle agitators or stirrers.

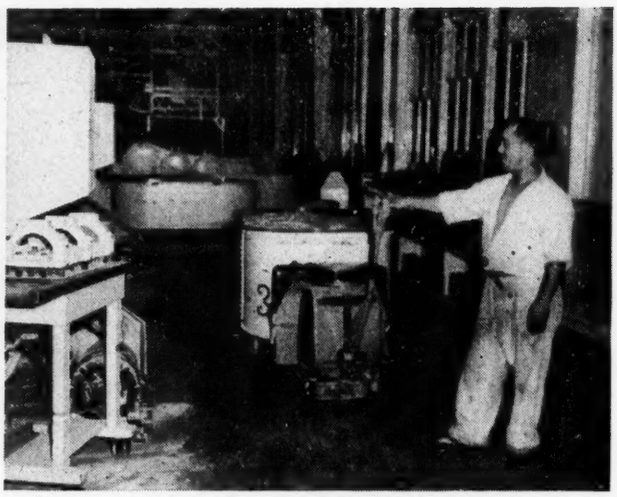

FIG. 7. TROUGHS of dough are taken by one man from fermentation room to make-up area by lift truck; without lift truck as many as three men are needed. Plant production operations follow a carefully timed schedule.

cal in soda cracker fermentation. Below this point there is no occurrence of an abnormal pH increase during baking (Tables I and II).

Effect of Iron

Aside from oxygen, iron is one of the elements most necessary for living cells[8]. The catalytic effect of iron in cell respiration has been studied and reported[9]. Iron-protein enzyme systems in biological oxidations as applied to wheat technology have also been studied and reported[10, 11]. In soda cracker fermentation, some of the iron present in flour (6 ppm) is assumed to be present in oxidizing enzymes, as a complex iron - porphyrin - protein compound. These enzymes, such as catalase, peroxidase and cytochrome are also present in the yeast. However, the amount of iron in the crackers (Table IV) is very much higher because of the iron picked up from the iron troughs. This inorganic iron is also very well known to have a powerful catalytic effect on biological oxidations, especially in the milk and fat and oil industries.

Comparative studies on soda cracker sponges fermented in wooden and iron troughs show less variation of pH in sponge fermented in the wooden troughs than in the iron troughs. No abnormal pH increase during baking was observed in the crackers baked from the doughs fermented in the wooden troughs. The iron content of the crackers made in iron troughs (Table IV) varies greatly and although there is no direct relationship between the quantity of the iron and pH increase, an abnormal pH increase during baking was in many cases associated with higher iron content.

Shortenings such as oleo oil and especially lard, used in quantities of about 10 percent based on weight of flour in soda cracker doughs, contain traces of inorganic iron (1 to 5 ppm). It was found that by changing from one brand of lard, "A", with 2 ppm of iron to another brand, "B", with 5 ppm of iron, the number of the doughs with abnormal pH rise was increased by 23 percent. Over a period of years, oleo oil (extra grade) has shown 1 to 2 ppm of iron while lard has shown as much as 5 ppm. Also, the percentage of the doughs with abnormal pH increase has been shown to be greater with lard than with oleo oil. The conclusion reached is that shortening in soda cracker fermentation does affect fermentation and pH and contributes to the variations in quality of the product.

Discussion

From the result of these studies carried out so far, iron is regarded to be a second factor causing variations in soda cracker fermentation and baking.

A study of pH and fermentation temperatures in Tables I and II, shows that no two doughs are alike. There is an average of 6 deg. C. (5 to 7 deg. C.) temperature rise in the sponge (from 22 to 27-29 deg. C.) and 1 to 2 deg. C. temperature rise in the dough (from 28-29 deg. C. to 29-31 deg. C.) which cannot be correlated with pH. Such a relationship probably would exist even though all microbiological variables were standardized. During baking the pH increase, especially an abnormal one, cannot be correlated with temperature increases in the sponge and the dough nor with pH in the sponge. It was found that in the dough, however, an abnormal pH increase does not occur if the pH of the dough at the brake is below 6.5.

Bacterial fermentation contributes to the flavor of the product and affects the pH increase during baking because of the presence of oxidation-reduction enzyme systems. Under certain conditions, if the pH of the dough at the brake is above 6.5 and if the troughs are microbiologically inactive or partially active, abnormal pH increase during baking may occur to give a cracker of poor quality. It was found that on Monday, when only partially microbiologically active fermentation troughs (not in use and dried out for two days) are used, the number of the doughs with abnormal pH increase was 24 percent; 16 percent on Tuesday and Wednesday and 12 percent on Thursday and Friday. Present production methods do not control

TABLE III—Effect of Trough on pH and Temperature.

		Old trough	Sterile trough	New trough
Sponge set..	pH.....	6.0	6.0	6.0
	Temp. °C ..	22.0	22.0	22.0
Sponge at Remix	pH.....	4.8	5.4	5.5
	Temp. °C ..	28.0	27.0	27.0
Dough set ..	pH.....	6.7	6.9	6.9
	Temp. °C ..	28.0	27.5	27.0
Dough at Brake	pH.....	6.6	6.8	6.8
	Temp. °C ..	29.0	28.0	27.5
Cracker	pH.....	7.4	8.7	8.9

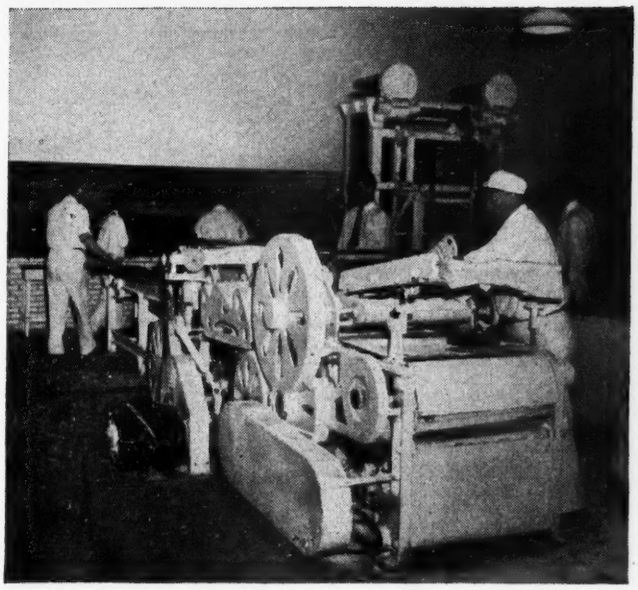

FIG. 8. DOUGH, after two passes through the brake (extreme right), is sheeted, imprinted or scored and peeled into reel ovens. Normal dough has pH 6.5 to 6.8 and 29.0 deg. C. temperature at brake.

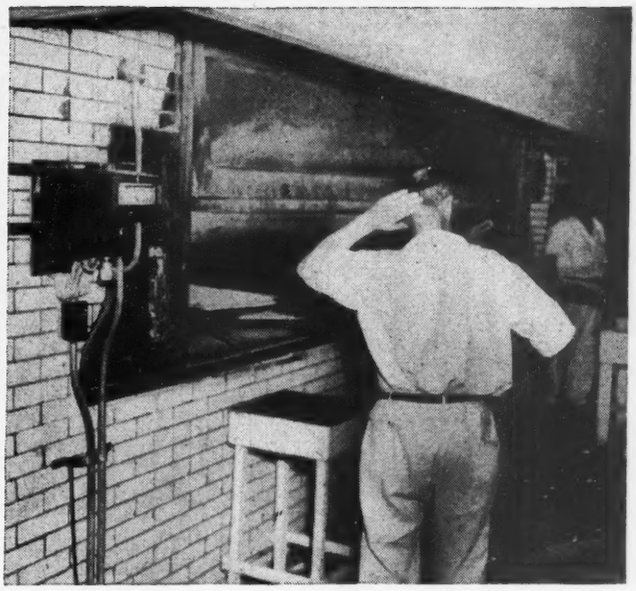

FIG. 9. BAKING is for 3 to 4 min. in gas- or oil-fired reel ovens under automatic control. pH increases during baking vary from about 0.8 for good crackers to approximately 2.0 for poor ones.

the microbiological condition of the fermentation troughs and bacterial activity is very seldom taken into consideration when difficulties are experienced in production.

Human errors were held responsible for many variations in soda cracker production in the past. Present indications are that these variations may actually have been the result of uncontrolled factors affecting the production. The results of our studies accordingly should not be surprising nor our conclusions puzzling.

Soda cracker fermentation is similar to sour rye bread doughs, where over-night sponges are used and bacterial fermentation is of utmost importance. About 200 strains of lactic acid bacteria have been isolated from the Danish rye breads[12]. Some of these bacteria formed lactic acid only while others also formed acetic acid, alcohol and carbon dioxide. The latter strains gave sour dough and bread their special flavor and aroma. "Sour bread" is identified to be the result of bacterial fermentation, primarily the lactic acid fermentation[13]. These bacteria were introduced either in the yeast or flour. Some workers claim the isolation of "true sour dough bacteria[14]" and others[15] report that combinations of the right bacteria and yeasts gave high quality bread and that bacteria from wheat and rye leaven were similar.

In these sour rye bread doughs the bacterial fermentation is better understood and controlled than it is in cracker making. The status of trace metals differs in that the effect of their presence has not been so well studied and reported. Discoveries of recent years, however, indicate abundant evidence of the reaction of metal ions with protein and amino acids and the formation of metal-protein complex ions on the alkaline side of the isoelectric point. This evidence is only of a qualitative nature[4, 5]. The metal cations function as activators of many enzyme reactions and the explanation of this reaction is that the associated metal-protein complex represents the active form of the enzyme. The metal serves as an activating prosthetic group[5]. Lately metal-proteins were studied in "oxidizing enzyme systems"[10] and in "oxidizing enzyme systems of wheat and flour"[11]. The dipolar ionic structure of proteins and amino acids, which are considered to be amphoteric compounds (ampholytes) carrying negatively charged carboxyl groups and positively charged amino groups has been studied[4].

There is ample basis for conviction that the quality and uniformity of many food products is influenced by the pH during processing.

TABLE IV—Iron Content and pH of Soda Crackers.

Soda Cracker	pH	Iron, ppm	Soda Cracker	pH	Iron, ppm
1	6.4	7	19	7.8	24
2	6.4	33	20	8.0	10
3	6.4	12	21	8.2	15
4	6.5	9	22	8.3	48
5	6.6	11	23	8.5	22
6	6.6	20	24	8.6	34
7	6.8	38	25	8.6	27
8	6.9	6	26	8.7	28
9	7.0	14	27	8.7	54
10	7.0	8	28	8.8	12
11	7.2	32	29	8.9	45
12	7.3	10	30	8.9	60
13	7.4	23	31	9.0	7
14	7.4	11	32	9.0	42
15	7.5	16	33	9.1	26
16	7.6	8	34	9.1	50
17	7.6	15	35	9.2	33
18	7.7	13	36	9.3	65

During World War II, pH was included in all Specifications on Biscuit Type Army Rations. One of the largest biscuit and cracker manufacturers is reported to have a "pH" man to check production[16]. As early as 1924, extensive researches on soda cracker fermentation and baking were carried out; attributing pH changes during baking to the conversion of the sodium bicarbonate into normal sodium carbonate[6, 7].

In these studies on soda crackers observations are interpreted in the light of these published data and deductions and conclude that the abnormal pH increase during baking is the result of:

1. Undesirable bacterial fermentation due to variations in the microbiological condition of the fermentation troughs.
2. Effect on protein in dough of oxidation-reduction enzyme systems activated by metal cations, especially iron.
3. Interaction between sodium ion and protein.
4. pH above 6.5 in dough at the brake.

It was also concluded that bacteria and iron in the dough are the chief factors responsible for the wide variations in pH increase during baking and for the variations in quality of the finished cracker.

References

1. Mika, Jan. Soda Requirements of Cracker Flours, *Cereal Chem.* 18: 483-497, 1947.
2. Bergey, David H. Bergey's Manual of Determinative Bacteriology, 1939.
3. Hammer, H. W. *Dairy Bacteriology*, 1938.
4. Cohn, Edwin J., and Edsall, John T. Proteins, Amino Acids and Peptides as Ions and Dipolar Ions, *Am. Chem. Soc. Mon.*, 90, 1943.

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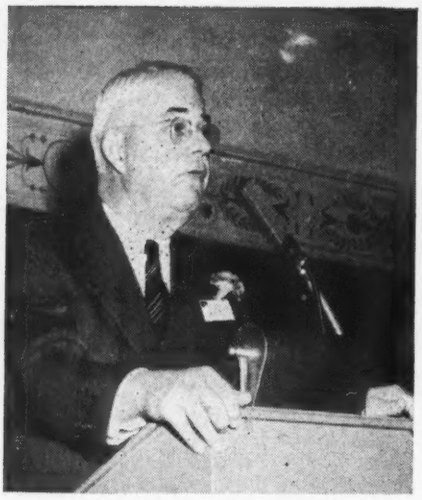
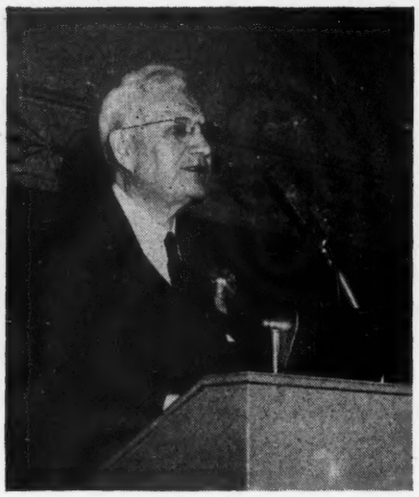


MEETING IS OPENED by Mason T. Rogers, president of the Packaging Institute.



NEW EXECUTIVE DIRECTOR, L. V Burton, announces plans of the Packaging Institute.

PROJECTS of Technical Committee are outlined by E. L. Hobson, Monsanto Chem. Co.

Aid To Its Members Stressed

Program features problems of production men and manufacturers of materials

By JOHN V. ZIEMBA
Assistant Editor
"Food Industries"

EMPHASIS on coordinating the efforts of production men, machinery manufacturers and suppliers of packaging material occupied the interest of those attending the ninth annual meeting of the Packaging Institute in New York City. Programs of the two-day meeting were arranged for the interest of the three groups of members, particularly the production members. A session for the machinery manufacturers and users was devoted on what should, can and will be done with packaging machines. Another session for suppliers of material and production men was given over to metal closures, glassine papers and the perspective on packaging. Seminars on beverages, food and candy were directed toward production men. Two luncheon periods were set aside for discussions by the Technical Committee and the Standards and Practices Committee on projects completed, underway and proposed.

New Executive Director

Aid to the institute's members with the objective of saving time, money and trouble in packaging was announced as the policy of L. V. Burton, new executive director of the institute. He said that he plans to call on members and learn their problems so that the activities of the institute will be most helpful to them.

To determine the type of problems worthy of study by the institute, Dr. Burton cited some 18 possible projects and submitted a list of these projects for members to check off as to importance and timeliness. In addition, members were requested to list other projects that they believed the institute should study in the new executive director's ambitious program.

Proposed projects included:

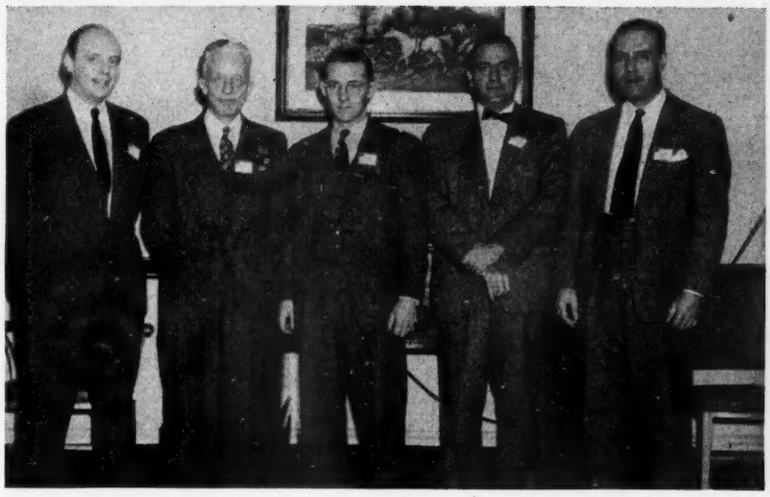
1. Methods of recording production speeds.
2. How to measure packaging costs.
3. Study of unit packaging operations such as filling, wrapping, sealing, bundling, closing and labelling.
4. Effect of Marshall Plan and possible national emergency on packaging.
5. Effects of revised Rule 41 on shipping containers.
6. Liaison with organizations that affect packaging.
7. Filing of regulations regarding shipping containers on common carriers.
8. Survey of age, type and location of packaging machinery.
9. Tabulating various tolerances of spoilage in packaging operations.
10. Mathematics of deceptiveness of packages.
11. How to set up a packaging laboratory.
12. How to plan a packaging line.
13. Tough jobs in packaging.
14. Methods of increasing speeds of the various packaging operations.
15. Economics of quality control in packaging.
16. Unsolved packaging problems.
17. Bulletin reports on:
    (a) Vacuum packaging
    (b) Nitrogen packaging
    (c) Trends in packages for greasy materials
    (d) Survey of consumer desires
    (e) Standardization of package sizes.
18. How to differentiate between a packaging problem and a different sort of production problem.

Machinery Men and Users Need Understanding

The session on packaging machinery took the form of two talks, followed by a question and answer period conducted by Carl E. Schaeffer, president, Stokes and Smith Co.

F. Chilson, Industrial and Packaging Consultant, emphasized the lack of understanding between manufacturers of packaging equipment and users of the equipment in "production attitude." Machinery manufacturers lack the production point of view. For example, cleanliness has definite meanings to the equipment manufacturer and food processor. To the average designer, cleanliness means "clean" from a machine shop point of view. To the food processor it means a machine designed for easy cleaning.

Machinery manufacturers could acquire the production point of



WAITING for luncheon of Standards & Practices Committee, left to right: H. T. Holbrook, A. B. Clunan, Glenn Whetzell, A. G. Griswold and G. O. Manypenny.

DISCUSSING packaging problems, left to right: A. R. Schaefer, Al De Witt and R. Wellbrock.

At Packaging Institute Forum

and machinery, committee sessions and the new executive director's inaugural

view either by hiring their designers from plants of equipment users or by putting their designers to work as installation mechanics in production plants.

Better trained service men are also essential. Some machinery manufacturers do not send their best men out on the road. Instead, they keep their best designers and mechanics in the plant to get out production.

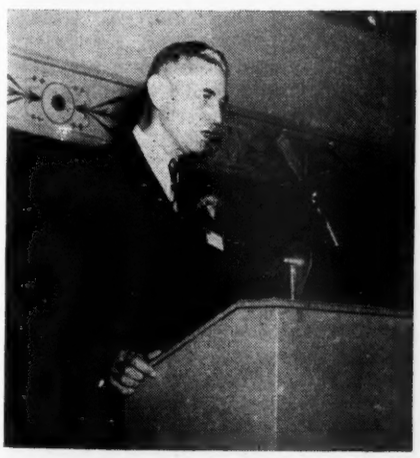
Equipment manufacturers also have a problem in producing standard equipment to handle a wide variety of products. Packaging machines cannot be turned out on a production line basis like automobiles, each exactly like the other. Instead, standard machines have to be adapted and adjusted to conditions in particular plants before they can operate satisfactorily.

Users of equipment want to maintain cordial relations with the manufacturer. Consequently, equipment manufacturers should be organized so that when the word of a company representative is given, it will be backed up. Deliveries should be maintained. If, for some reason, they are not, a tickler system should be kept so that purchasers can be notified. Users should also be provided with a good inspection service. Machinery parts should be inspected before they are assembled for delivery. Equipment must not be shipped without motors, with wrong gears or wrong hoppers. Before making a shipment, the manufacturer should compare the original orders with the machine.

Sometimes the machinery people do not get the cooperation they need from users. Production people sometimes want standard equipment to do a non-standard job. Users should make available to equipment manufacturers all the production experience they have available.

What Equipment Users Want

A. F. Stevenson, production manager, The Borden Co., discussed the production man. He said that production methods must be altered to meet changing labor conditions. While production men are, for example, only slightly interested in production lines operating at a rate



DEVELOPMENTS in packaging are reported by G. W. Reece, American Can Co.

MERITS of rigid vs. flexible types of containers are given by C. Olin Ball.

REQUIREMENTS of closure liners are listed by J. M. Wheaton, Owens-Illinois Glass Co.

PACKAGING MACHINERY session hears F. Chilson (at microphone) and A. F. Stevenson (right) point out problems facing manufacturers and users, as chairman Carl E. Schaeffer (left) presides.

SEMINAR TALKS on foods, candy and tobacco are given by E. A. Throckmorton (at the microphone) and R R. Melson (right), under the leadership of A. B. Brackett, seated below projection screen.

of 100 packages per minute, they are very interested in ones going at the rate of 200 per minute.

Users also want equipment that can be quickly adjusted, particularly machines in which adjustments are made once and for all before they leave the plant. This would eliminate several daily adjustments now necessary by production men.

Machines must be simple to operate. Simplicity applies to lubricating, changing parts, and a rapid change-over from one size container to another.

Production men also run into difficulty wherever there is a change of motion on a packaging line. Problems may be twofold, for example, wherever there is a change of motion from the filler to the capper, causing a spillage of product. Difficulties will be encountered with regulatory officials because of underweights, and a loss of an expensive product will also occur.

Fillers and cappers must also operate at the same speed. If a filler is running at the rate of 150 containers per min., the capper must operate at the same speed or two cappers must operate at the rate of 75 per min.

Worn-out machinery parts must be studied thoroughly with the object of replacing them easily. Manufacturers must also furnish replaceable parts. Machine parts exposed to products must be encased to facilitate cleaning.

High-speed net weight fillers are greatly needed. Of utmost importance are volumetric fillers.

In setting up a packaging line for a new product, a production man should work with the machinery designer. In addition, representatives of container and cap manufacturers should be called upon to assist in designing the new packaging machine. When the machine is completed, adequate samples of the product must be used in testing its performance.

Studies must be made to eliminate corrosion of conveyer lines by certain products. Instant coffee, for example, wears out a conveyer line, while whole milk does not.

Packaging Materials

In the general session given over to packaging materials, H. W. Stevens, Benj. C. Betner Co., held the chair. In the opening talk, L. L. Lauve, Crown Cork and Seal Co., reported that, excluding crowns for beer and soft drinks and metal closures for dairies and home canning, the metal closure manufacturing industry will make about 8,000,000,000 closures in 1947.

P. S. Barnhart, Westfield River Paper Co., pointed to the improvements and developments of coated, waxed, laminated and plain glassine wrappers that will satisfy most of the conditions of the food packer. As an example, he listed the following developments in the functional properties of glassine wrappers:

1. Resistance to the passage of oils and greases.
2. Resistance to gas transmission —a great aid in preventing rancidity.
3. Resistance to contamination by molds and insects.
4. Resistance to passage of odors and flavors.
5. Waxed, coated or laminated glassines resistant to the passage of water-vapor.
6. High wet strength on specially treated papers.

Need for the producer of packaged goods to adapt his packages to new merchandising conditions was stressed by C. W. Browne, editor-in-chief, Modern Packaging. The producer must reduce his cost either through more standardization or the development of more high-speed, labor-saving machinery.

Liner requirements listed by J. M. Wheaton, manager technical development, Packaging Research Div., Owens-Illinois Glass Co., included: (1) Low moisture-vapor transmission, (2) low alcohol-vapor transmission, (3) resistance to leakage, (4) adequate chemical resistance, (5) freedom from pin holes, (6) low permeability to essential oils and flavors, (7) odorless and tasteless properties, (8) low solvent transmission, (9) nonadhesiveness to glass and (10) nontoxicity. He also pointed out that the choice of a liner is the users' responsibility since they know what their products must be guarded against. The liner manufacturer can supply users with liner requirements so that users can make their own decisions.

Developments in packaging were reported by Gar W. Reece, American Can Co. These included:

1. A transparent folding box, known as Plastate, is made by Interstate Folding Box Co., Middletown, Ohio, for packaging fresh fruits and vegetables.
2. Aluminum Co. of America's pure aluminum foil or foil-laminated constructions serve as oxygen-excluding wrapping media for frozen foods, particularly fowl and meats.
3. The Bakelite Corp. has recently started production on polyethylene films, 0.001 to 0.005 in. thick. Calendered and press polished Vinylite rigid sheets are now being used for set-up containers.
4. According to Celanese Plastics Corp. cellulose acetate film can now be heat sealed to itself and/or to paper on standard equipment using Teflon as a covering for the heat sealing units.

American Tool Co., Cincinnati, Ohio, has developed a transbomatic machine for making rectangular boxes from rolls of plastic film.

5. Dewey and Almy Chemical Co.

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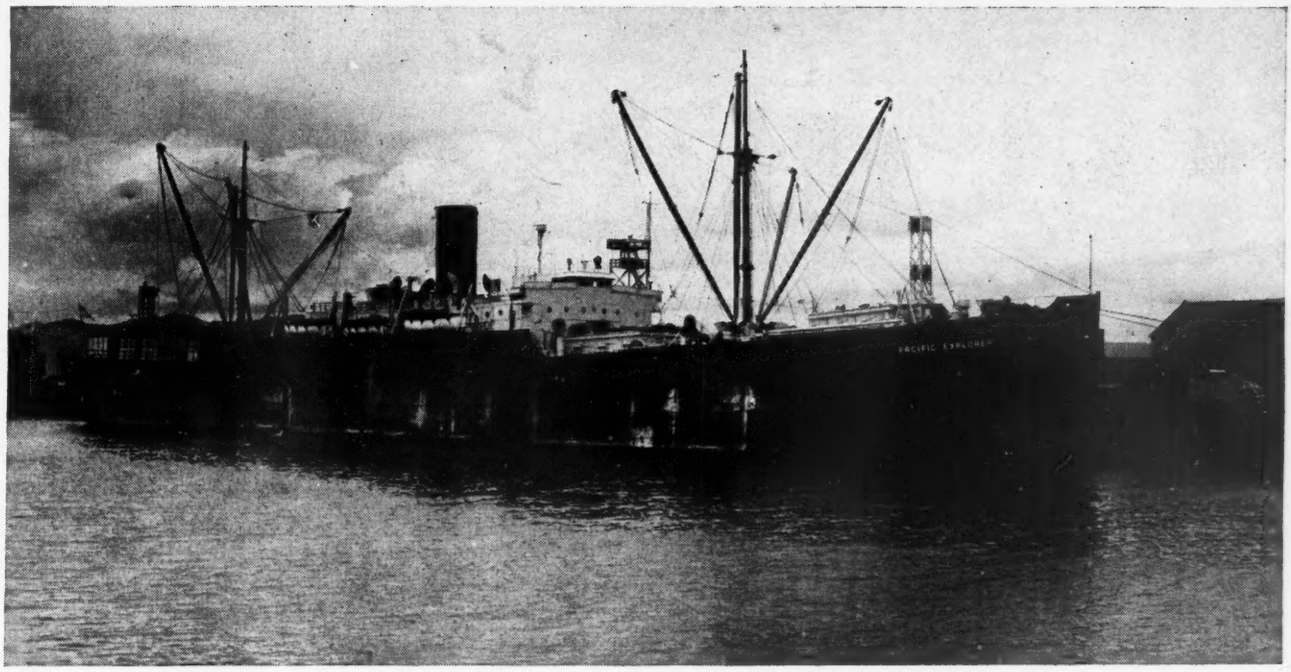


MOTHER SHIP S.S. Pacific Explorer, formerly an 8,800 ton class of vessel built during World War I. Ship is the property of R.F.C. and is operated by the Pacific Exploration Co., of Seattle, Washington. Vessel, 410 ft. long, was converted to a floating freezer.

Maiden Voyage Proves Value Of Mother Ship in Tuna Fishing

Canners are planning to convert more vessels for receiving and freezing tuna in tropical waters, and transporting the catch to the U.S. mainland

By CARL B. CARLSON, U. S. Fish and Wildlife Service
Fishery Technological Laboratory, Seattle, Wash.

THE Pacific Explorer, cargo ship built during the first world war and later converted for mother ship operation, returned recently from her maiden tuna voyage to Costa Rican waters. Stowed in her refrigerated holds was a near capacity fare of 2,250 tons of frozen tuna, which was unloaded at Astoria, Ore.

The ship sailed from Astoria early in January, 1947, to Costa Rica where she served as a mother ship for a fleet of tuna fishing vessels. Approximately five months were spent obtaining and freezing the cargo.

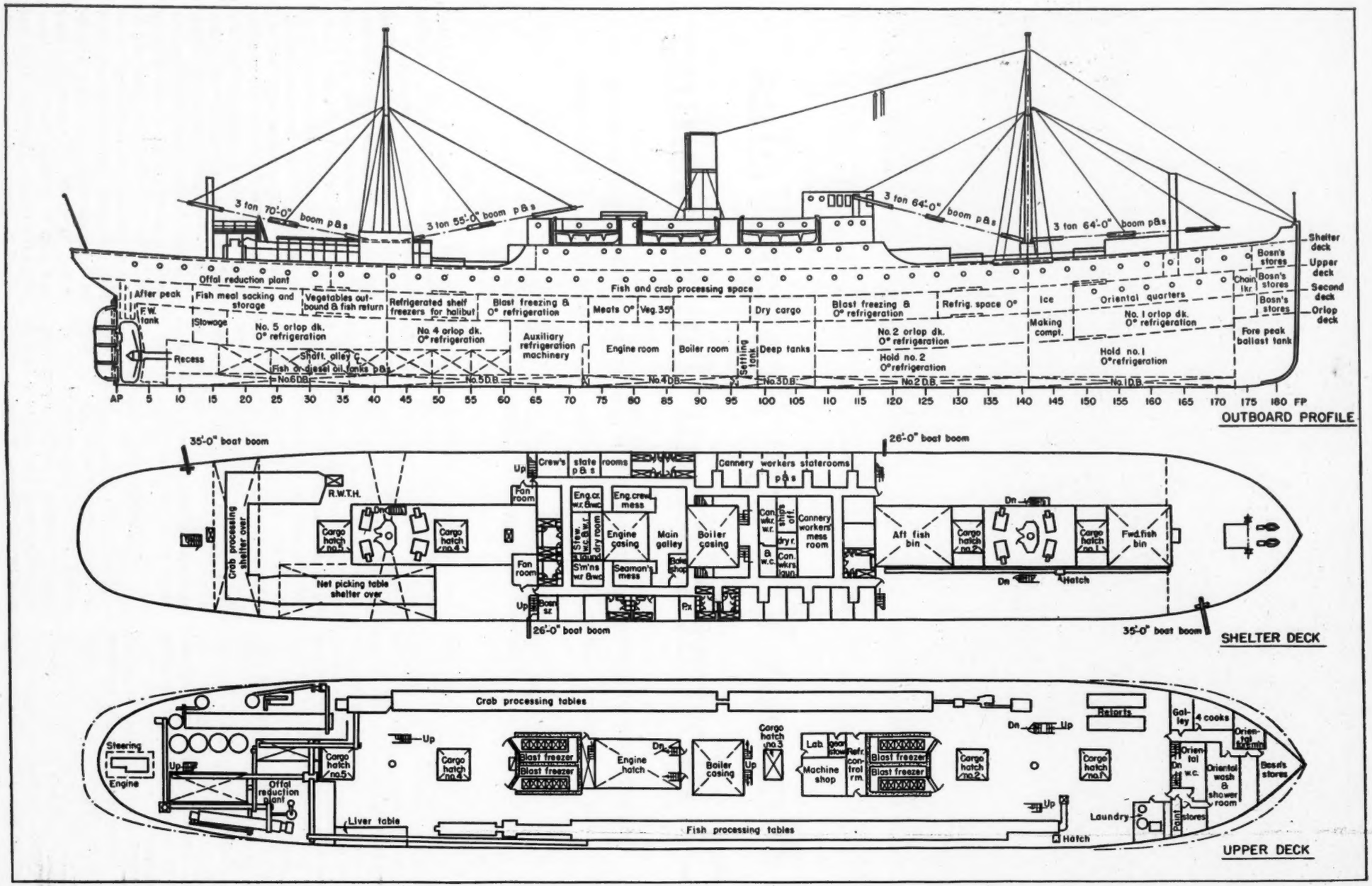
While the use of mother ships for tuna fishing has heretofore been considered impractical, the operation of the Pacific Explorer has induced a number of tuna canners to convert, or to plan to convert vessels in the 500-1,000-ton class for receiving and freezing tuna in tropical waters. The frozen fish will then be transported to the States for subsequent processing and canning. This method of operation will be a decided advance in the tuna industry. Smaller tuna fishing vessels, having only a limited cruising range, can then go to the heart of the Central American tuna grounds. There they will depend upon a mother ship for supplies and for the refrigerated storage of their catches. Such an operation will provide a longer and more productive season.

Converting the Vessel

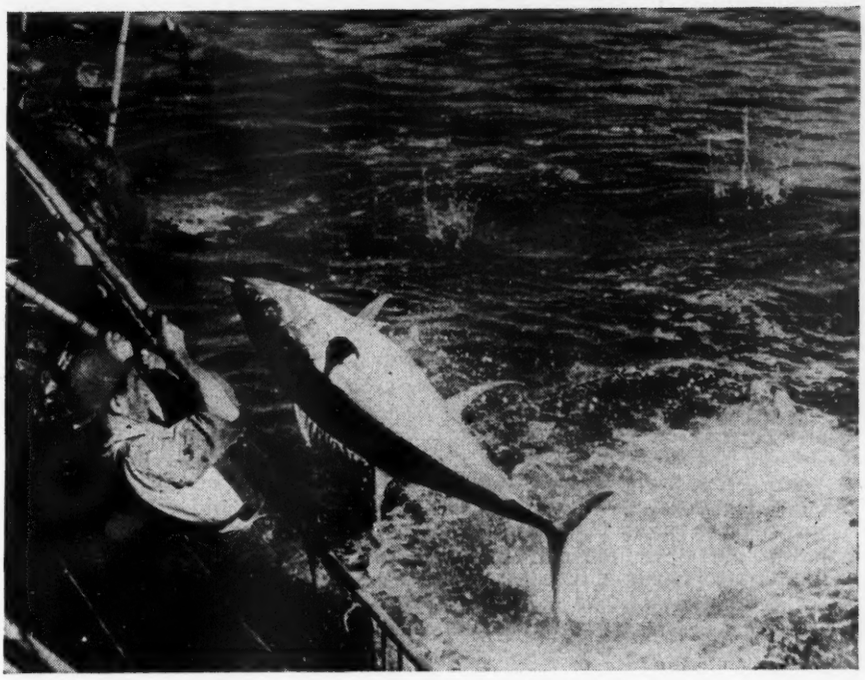
The Pacific Explorer is 410 feet in registered length and is propelled by a reciprocating steam engine of 3500 hp. Before conversion, the ship was a 3-island type having a raised bridge deck and a raised poop. The vessel is now adapted for both the tuna trade and Bering Sea crab and fillet operations.

To provide additional working space and quarters the ship was converted to a flush deck type, and a new deck house was built. These changes and the addition of a forecastle permitted accommodations for over 240 persons and allowed the use of the entire former weather deck level for processing fish and crabs in the Bering Sea operation.

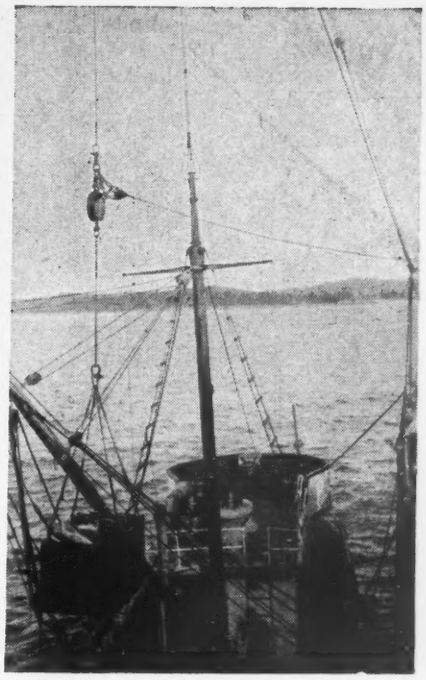
In her former trade, the vessel was principally used for carrying bulk cargo of a type that would not be affected unduly by deep stacking or piling. In handling frozen and packaged fish it was necessary to add an additional deck in the holds to avoid excessive stacking and also to provide better refrigeration facilities. The orlop deck was added as shown, forward and aft,



SCHEMATIC DESIGN of S.S. Pacific Explorer. Extra deck space was provided as well as refrigerated storage and accommodation for processing equipment for tuna, crab and fish fillets.



THREE-MAN fishing team, standing on the fishing racks overhanging the stern, strains to land a one-hundred pound tuna. Work is strenuous, takes years of experience.



BOXES of one-ton capacity are hoisted by ship's tackle from small fishing vessel.

in the schematic design. In the two after holds, this deck was welded to the shaft alley and the resulting side compartments were converted to tanks for storing either 300,000 gal. of diesel or fish oil. Various bulkheads were installed in the holds to provide convenient storage and freezing rooms. The various refrigerated compartments were insulated with a minimum of 9 in. of fiber glass and the freezer spaces were protected with cork board insulation with a minimum thickness of 8 in. Where extremely warm surfaces were encountered, insulation up to 12 in. thick was used. The interiors of all holding and freezer rooms were sheathed with steel to promote ease of cleaning.

Refrigeration

It is believed that the ammonia compressor plant of the Pacific Explorer has larger capacity than any other installed on a United States vessel. While there are refrigerated ships having a cubic capacity far in excess of this ship they are designed for transporting meat and fruit, and few, if any, are expected to hold cargo at less than 15° F. The cargo space on the Pacific Explorer can be held at 0°F. or lower and there is freezer capacity for 120 tons of fish. To insure continuity of operations and safety of the cargo in the event of a partial breakdown of the compressor plant, a suitable safety factor was incorporated in the design. Under practical operating conditions it was found that the capacity of the plant was not in excess of actual needs for tropical conditions.

The ship's refrigeration is a flooded system. A two-stage compressor plant is used because of the very low temperatures desired in the freezers. There are two booster compressors driven by motors of 125 and 50 hp., having respective capacities of 134 and 65 tons of refrigeration at a suction temperature of –25° F. and a discharge pressure of 24 psi. Two of the high-stage machines are each driven by 175 hp. motors and have a combined capacity of 230 tons of refrigeration, while a third high-stage compressor is driven by a 45 hp. motor and has a capacity of 21 tons, all at a suction pressure of 24 psi. and a discharge pressure of 190 psi.

The booster compressors draw gaseous ammonia from surge drums at various locations about the ship, and discharge the partially compressed gas into a direct-expansion liquid and gas cooler. This gas is further compressed by the high-stage machines and then condensed. A portion of the liquid ammonia is used in making ice and in cooling water for the ventilation system. The ice plant has a capacity of 10 tons per day. The design permits the remaining liquid ammonia to be further cooled by being passed through coils in the direct-expansion liquid and gas cooler. This sub-cooled liquid is used in the storage and freezer spaces. Hot gas from the high-stage side may be used to defrost the coils.

The subcooled liquid could be pumped to surge-drums reservoirs, then circulated through the various freezing coils throughout the ship. In actual operation, however, there was no advantage in the subcooled liquid. The ammonia absorbs heat in the freezing coils, evaporates, and is drawn back to the surge drums and thence to the suction side of the boosters.

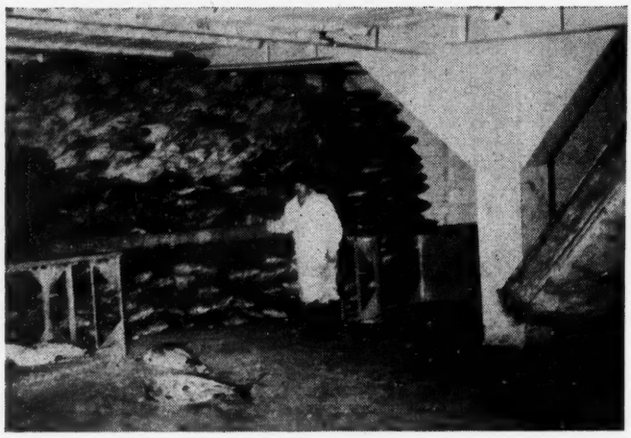
Blast Freezers

Each of the four upper-deck blast freezers will take a charge of 6,000 pounds of packaged fillets on a system of racks and trays. Fillets are expected to be frozen in less than 6 hours. By the removal of a portion of the trays, it was planned to freeze small tuna on the same racks but the individual capacity was too small for efficient use. In the large blast freezers on the second deck, the larger tuna are placed on individual trays which are supported by an iron framework. Several portable conveyors of vertical and variable-angle types will be used to transfer materials between various levels.

The power for the compressor plant, fish house, and ship service is supplied by 3 AC diesel-electric plants, each developing 300 kw. and having a prime mover of 450 hp. Here again the capacity is in excess of the actual requirements to insure the continuity of operations and the safety of the cargo in the event of partial breakdown.

To render the ship independent of shore facilities, it was necessary

HINGED ends of boxes facilitate unloading tuna brought aboard the mother ship from the small fishing vessels.



TUNA from upper or "cannery" deck level are fed down chutes to freezer rooms, then go to refrigerated storage.

to evaporate sea water for drinking, bathing and other purposes. Two evaporators capable of producing 45 tons of potable water were installed to provide for human needs and ice. The ice was made in cans immersed in a cold brine in a manner similar to that encountered on shore installations. However, the overall cost of manufacturing ice from distilled water is rather expensive and the plant was only used to supplement the supply of ice obtained from shore.

Fishing Operation

The tuna brought back by the mother ship were caught by a fleet of purse seiners and live bait boats. A purse seine is a large encircling net which fishermen set around the school of tuna. It could be compared to a fence of netting buoyed at the surface of the water. The fishermen then purse or close the bottom of the net to surround the fish with a bowl of netting. The bottom of the net is then lifted aboard and the net hauled from one end until a concentration of fish is reached. A point in the net beyond the concentration is selected and the cork line, netting and lead line are gathered and tied to the ship. The fish are then further concentrated by hauling additional net. The fish are finally brailed into the hold and packed in ice pending delivery at the ship. This process is repeated until the net has been emptied of fish.

In live bait fishing the first step is to secure a supply of bait. This is captured near shore or in bays with small nets called lamparas. The bait is transferred alive into tanks in which a stream of sea water is circulated. After arriving on the fishing grounds, and locating a school of fish, one man called the "Chummer" throws live bait overboard to attract the school of tuna. The fishermen stand in racks overhanging the stern and work lines in the water to stimulate the action of the bait. They may work individually or in teams of 2 or 3 men depending on the size or weight of the tuna. Fishing gear consists of a stout bamboo pole about 9 feet long with a line, leader, and lure, about 6 feet in overall length, attached to the tip. When a large fish strikes the squid (artificial bait) the teams, working in perfect unison, or single fishermen if the tuna are small, set the squid in the tuna's mouth. Then, in simultaneous flowing action, they raise the heavy tuna from the water and lift it onto the deck. After the school has ceased biting and fishing ceases, the work of stowing the fish in the boat's hold begins.

Refrigeration on Small Boats

Two methods of refrigeration are used in the holds on tuna boats. The more modern vessels use a system of brine and refrigeration, while others use ice and refrigeration. Some vessels have a combination. On an ice boat the fish are packed in ice using about one ton for two of fish. The melting ice reduces the temperature of the fish and the refrigeration coils gradually remove heat: after a period of one week or longer the fish and ice mass becomes completely frozen.

Where the brine system is employed, the fish are placed in tanks provided with refrigeration coils and warm or cooled seawater added. The seawater is circulated through the fish and refrigeration coils until the temperature has approached freezing. A fresh supply of seawater fortified with salt is then introduced to the tank and the temperature reduced to a range of 15 to 20° F. The brine is then removed and the tuna are held in dry low temperature storage. Fishermen prefer the brine system because of the significant reduction in labor, but the equipment is more costly.

Both shelf and blast freezers were used on the first cruise, and from 12 to 48 hours were generally required for freezing depending on the size of the fish, amount in the freezer, and type of freezer. The total capacity of the freezers was about 130 tons and the individual capacity varied from 15 to 50 tons. With allowances of time for loading and unloading, a daily capacity of 75 tons was all that could be anticipated. After freezing, the fish were fed to chutes or dropped into the storage rooms and stacked. A number of fish were also frozen by moving them directly into the holding rooms and spreading them out on the floor. After the fish were stacked, they were given a protective glaze by spraying water over and into the pile, which quickly froze.

Crew of 61

The regular ships crew on Pacific Explorer consisted of 61 men including the following: 4 deck officers, a radio operator and purser, 9 sailors and a boatswain, Chief Engineer and 4 assistants, 3 junior engineers and 3 reefer men, 11 oilers, wipers, watertenders, and firemen, 2 machinists and an electrician, 12 in the steward's department, and 7 cold storage workers. During periods of heavy catches, additional shore labor was recruited as necessary. The operation was supervised by a general manager. Representatives of the Fish and Wildlife Service accompanied the ship as observers and technicians.

In addition to freezing the catch, the function of a mother ship was fulfilled by supplying ice, food, fuel, communications, fishing gear and effecting repairs to mechanical equipment.

How To Prevent Off Color in Glassed Carrots

Survey reveals prevalence of zonal discoloration due largely to oxidation and diffused brownish tinge attributed to reducing sugars and amino acids. High vacuum eliminates former, antioxidants improve color throughout jars

By F. J. YOURGA, Food Technologist, Hartford-Empire Co., Hartford, Conn.

RESULTS of a laboratory investigation suggest two ways of controlling brownish discoloration of glassed carrots, a condition most commonly encountered in the strained types. They are: Controlling the vacuum in the jars at 20 inches and the use of antioxidants.

This investigation resulted from a recent survey which showed that discoloration is very common in many brands of glass packed carrots, both diced and strained. It appeared as a brownish tinge diffused throughout the product, with a localized grey-brown off color near the top surface.

One of the first steps in attacking the problem was a check of several hundred samples of glass packed carrots, marketed as baby food. This check disclosed the correlation which existed between the presence of discoloration and the degree of vacuum used to seal the container. The threshold for discoloration was a vacuum of 15 in. mercury, with a gradual intensification of off color as the vacuum decreased from this value. The presence of low vacuum and of severe localized discoloration at the top of the jar indicated that oxidation was partly responsible for producing this off color.

Experimental

A series of jars of strained carrots was sterilized in the laboratory at vacuums of 7, 11, 15 and 20 inches. The jars with 7 in. of vacuum had a band of discoloration at the top approximately 1 in. wide. Those with 15 in. had from a trace to ¼ in. of discoloration, indicating a border line case, while those with 20 in. of vacuum were completely unaffected. Of interest is the fact that, although samples prepared in the laboratory demonstrated that low vacuums can cause localized discoloration, there was no evidence of the diffused brownish tinge observed in commercial samples. This suggested that another factor might be involved in the total discoloration effect.

Reducing Sugars

A survey of technical literature indicated that reducing sugar-amino acid reactions might be involved in this problem. In the manufacture of potato products, such as potato chips and French fried potatoes, the concentration of reducing sugars must be controlled if products of the desired color are to be obtained. With this information in mind, jars of carrots exhibiting normal and off-shade colors were tested with Benedict's reagent to determine the reducing sugar content.

All samples exhibiting the diffused brownish tinge throughout the jar had from 2.5 to 4.5 percent reducing sugar, calculated as anhydrous dextrose. Samples of normal-colored carrots had 2 percent or less, and borderline samples contained from 2.0 to 2.5 percent reducing sugar.

In order to verify the conclusion that high reducing sugar content was responsible for the diffused discoloration, an attempt was made to reproduce it in the laboratory, as was done in the case of oxidative discoloration. Determinations of the amount of reducing sugar in raw Chantenay carrots, the variety most commonly packed in glass containers, showed a range in values of 1.5 to 3.0 percent. Since our method of preparing strained carrots in the laboratory with a Waring blender necessitated adding water equal in amount to the weight of carrots used, it was apparent that these raw carrots would result in a finished product with a very low reducing sugar content.

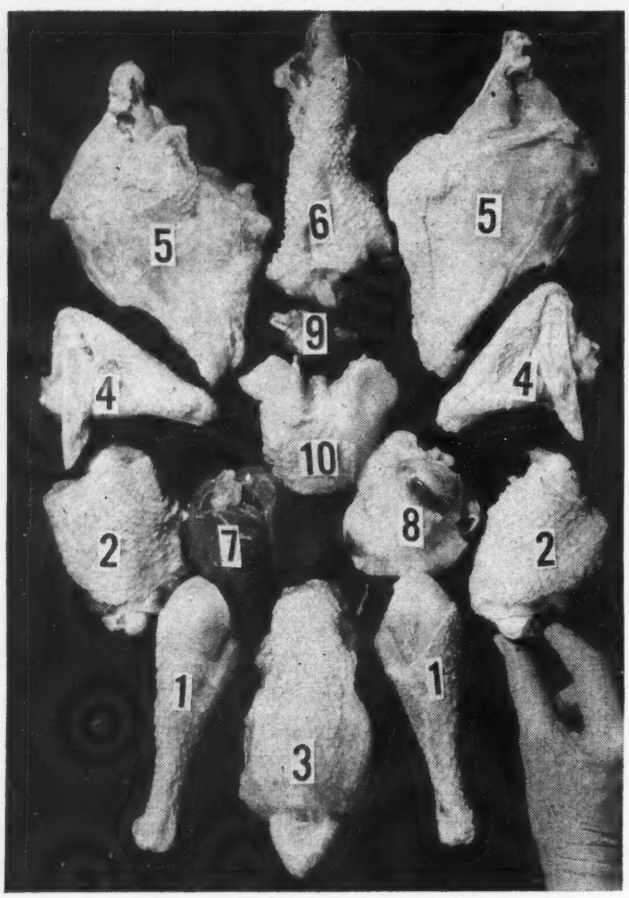
Dextrose was added to the strained carrots in concentrations of 3, 4 and 5 percent in order to increase the reducing sugar content. This produced no discoloration. When low vacuums were applied in conjunction with high levels of reducing sugar, typical oxidative discoloration developed in the upper part of the jars, but there still was no evidence of diffused discoloration.

Amino Acids

Since discoloration associated with reducing sugars usually involves reactions between sugars and amino acids, the negative results described above were assumed to be due to a lack of sufficient amino acids. An attempt was made to verify this possible explanation by adding equimolar amounts of glycine and alpha-aminoisobutyric acid to separate sets of strained carrot jars that contained 3 percent reducing sugar. The addition of these amino acids resulted in a slight degree of diffused discoloration in the samples containing sugar, but the degree of discoloration was not comparable to that observed in commercial samples.

Supplementary tests made to determine the significance of vacuum, reducing sugar and amino acids, involved the use of *l*-ascorbic and *d*-isoascorbic acids as possible preventatives for discoloration. Amounts ranging from 0.1 to 0.01 percent were found to prevent the oxidative type of discoloration in all tests with vacuum as low as 10 in. of mercury. Comparison of untreated jars with those containing ascorbic acids, both of which were sealed with various ranges of vacuum, indicated that ascorbic acids, in addition to preventing zonal discoloration at the top of

(*Continued on page* 214)



BONE DARKENING is found in the knee joint, leg and thigh. It occurs in severe cases in the back and second joint of the wing. Here are 14 pieces of cut-up frying chicken ready for packaging and freezing. They include: (1) Legs or drumsticks, (2) thighs or short legs, (3) back, (4) wings, (5) breasts, (6) neck, (7) liver, (8) gizzard, (9) heart, and (10) pulley bone.

BLOODY MARROW causes discoloration of bone and adjacent tissue during freezing and cooking. Legs of unfrozen fryers show bones filled with bloody marrow. (A) Leg with no indication of bone darkening. (B) Cross-section of leg showing bones and marrow. (C) Longitudinal section through leg and bone showing dark marrow. (D) Bone washed free of marrow was white and porous.

Prevention of Bone Darkening In Frozen-Packed Chickens*

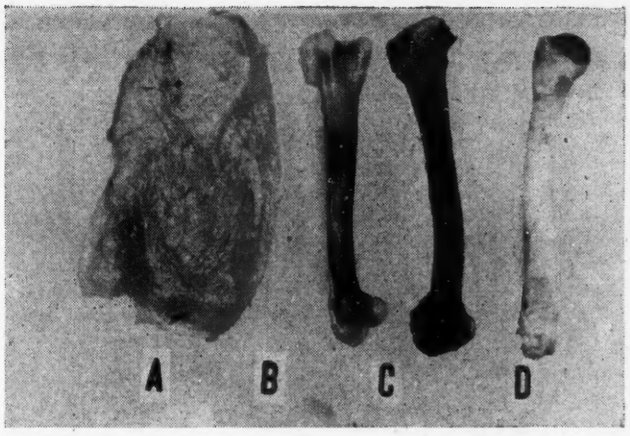
Darkening is confined to young chickens. Chilling before freezing and bleeding do not stop it, but blanching and storage below —15 deg. F. do

By J. C. WOODROOF and ETHYL SHELOR
Georgia Experiment Station, Experiment, Ga.

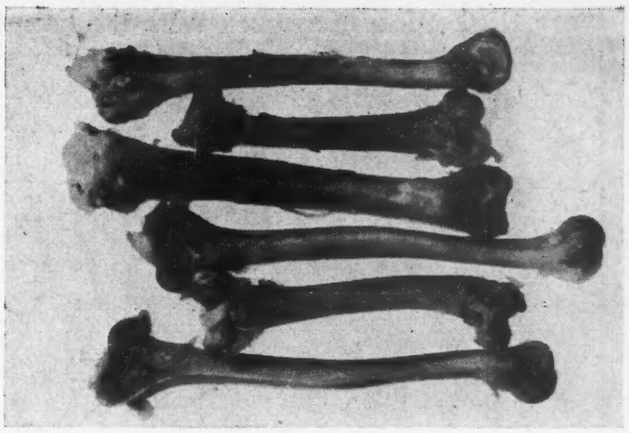
DARKENING of the bone and meat of certain frozen chicken cuts has been widely observed, but little has been known previously of its cause or prevention. It is common when young chickens are frozen at home, in freezer locker plants or in commercial plants, but seems to be worse in the South and East, where broilers and fryers are most popular. During the development of Georgia's 50-million dollar broiler industry over the last 15 years, the situation has apparently grown worse. Complaints from freezer locker plants have increased.

Before setting up experiments to determine the cause of darkening of bones in frozen chickens and how to prevent it, a study was made of chickens in commercial storage and freezer locker plants. It was found that sex was not a determining factor. Neither was darkening associated with the type of package or wrapping material used. Nor was it related to killing during any season of the year. It was also found that bone darkening did not affect the aroma, texture or flavor of the chickens, nor was it associated with

*Project sponsored jointly by the Georgia Agricultural Experiment Station and the Tennessee Valley Authority. Published with the approval of the Director of the Georgia Station as Paper No. 175 Journal Series.



UNCOOKED CHICKENS showed less discoloration than cooked chickens. (A) Thigh or "short leg" of uncooked chicken that was frozen. Bone darkening was not evident from the outside. (B) Bone of a similar cooked piece, which showed severe darkening. (C) Section of similar bone with bloody marrow, which discolored bone and meat. (D) Section of marrow-washed bone was white.



BONES IN YOUNG CHICKENS darkened because the bones were soft and porous. Darkening was not noticeable in mature chickens with calcified and non-porous bones. Condition of leg and thigh bones of frozen chickens after cooking. Upper three bones from fryers show discoloration that was worse at the joints. Lower three bones from hens show no evidence of discoloration.

"souring" or other types of spoilage due to bacteria.

Bone darkening is characterized by a bloody discoloration of the bone and adjacent tissue in certain areas in chickens. It is worse in the knee joint, leg and thigh. In severe cases, it occurs in the back and second joint of the wing. The white meat of the breast does not discolor. Darkening is worse at the bone and decreases further away from it. Seldom is it observed on the surface, either before or after cooking.

Nature of Bone Darkening

During cooking the color changes to a deep grey or brown, and in severe cases to black. Some chickens were badly discolored and were almost unmarketable. Other chickens showed practically no signs of discoloration.

To study the problems further, experiments were set up to include a wide variety of conditions to which frozen chickens are usually subjected. Unless otherwise stated, White Rock cockerels, 12 weeks old, from the same hatching and receiving the same food, were used. They were scalded at 160 to 180 deg. F., dressed, eviscerated and disjointed. Since bone darkening appeared first, and was always worse, in the legs and thighs, most of this study was confined to detailed examinations of these four pieces.

From observations made of frozen, uncooked chickens, discoloration of the meat seemed to originate from the bones. While some discoloration was found in the raw chicken, much of it developed during cooking, especially in the regions of the largest bones.

Frozen, deboned fryers, fried after one and four weeks' storage, showed no discoloration of the meat. Other fryers were frozen and later thawed and deboned before frying. There was only slight discoloration in these chickens in comparison with fried chickens containing bones. In both cases the aroma and flavor of deboned fryers were not as desirable as that of fryers with bones. For this reason, deboning is not recommended as a means of eliminating darkening.

Microscopic examinations were made of the bones and surrounding meat. These showed that the discoloration came from the marrow and penetrated through the bone into the meat. It was found by cutting and grinding that the hardness of the bones greatly influenced the permeability—the softer the bones the greater the discoloration of the meat. In young chickens the knee joint had soft areas which acted as channels for the passage of bloody marrow. The bones of fully grown chickens were usually hard throughout and there was practically no discoloration of the bones or adjacent tissue.

Darkening was found to be worse during the growing stage of the bones, when they were soft and porous. After the bones became fully hardened, they were calcified and non-porous, with little discoloration. The large bones of the legs and thigh contained an abundance of blood vessels. The large wing bones, on the other hand, were hollow and not discolored. The white meat was located near bones which did not discolor the flesh, while the dark meat was near the bones containing bloody marrow.

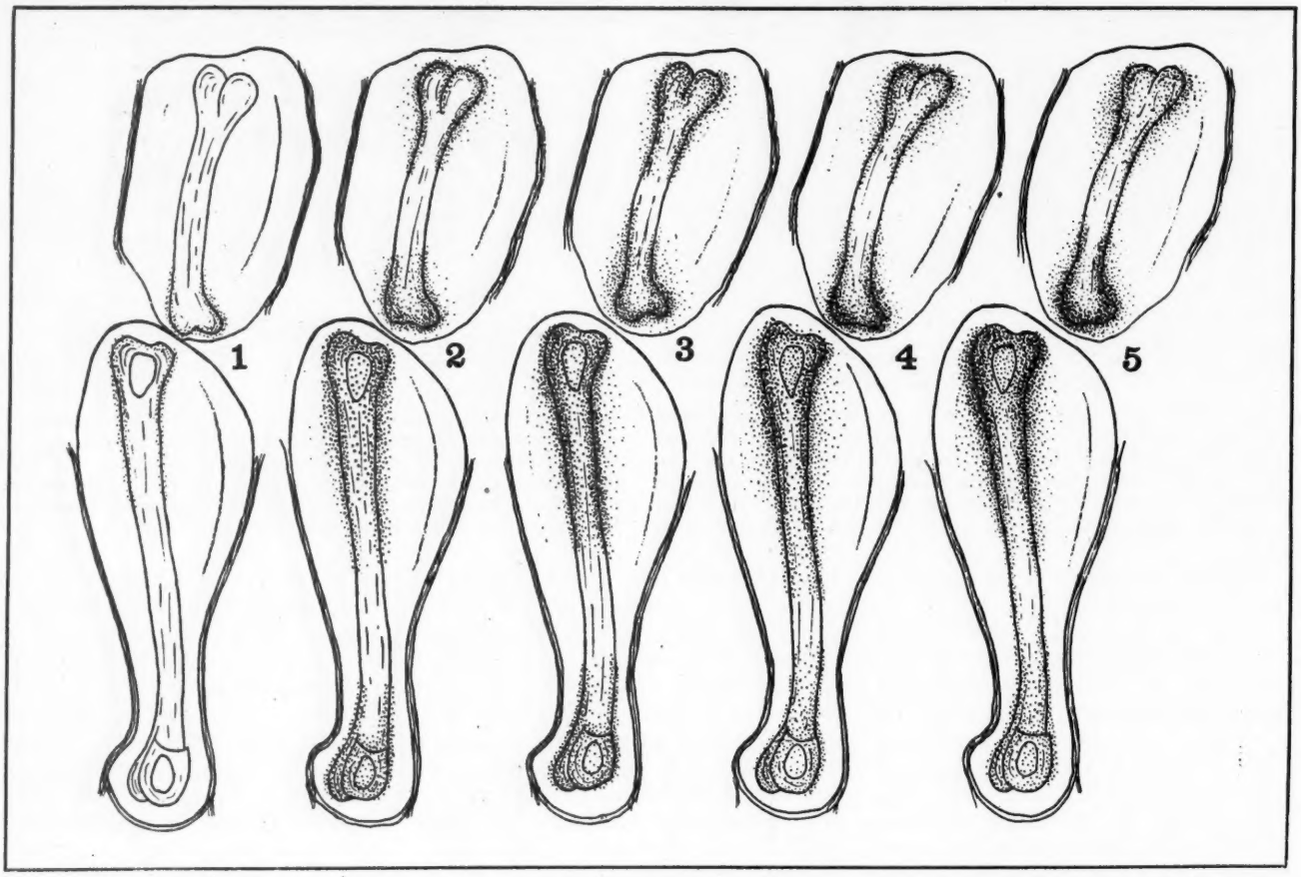
DRESSED ROASTING HENS of this size show no evidence of bone darkening. Instead, darkening is confined to young chickens during growing stage of bones.

Koonz[1] found that during freezing and defrosting, some of the pigments normally found in bone marrow of young chickens leached out through spongy areas and discolored the bone and adjacent flesh. Both Koonz[1] and Stewart[2] reported that bone darkening of chickens did not affect the palatability of the cooked meat. Dukes[3] found that freezing and thawing ruptured the stroma and caused hemolysis. Hemoglobin then separated from the red corpuscles and entered the blood plasma.

Age of Chickens

Darkening occurred only in young chickens, and the condition became worse after freezing. From a study of frozen chickens in two commercial freezing plants and in several freezer locker plants, it was found that bone darkening was related to the age of the chicken at the time of killing. In all cases broilers (not over 2½ lb.) and fryers (2½ to 3½ lb.) had dark bones, while hens and roosters did not. Bones of chickens killed while less than 12 weeks old were very dark. Those 12 to 16 weeks old were less darkened, while mature chickens were seldom affected.

Bone Darkening Increases With the Length of Freezer Storage



DARKENING INCREASED in "drumstick" and "short leg" bones of fryers that were cooked during six months of storage at 0 deg. F. (1) Immediately after freezing, (2) one week in storage, (3) four weeks' storage, (4) 12 weeks' storage and (5) 26 weeks' storage.

In commercial plants bone darkening was much worse in frozen chickens than in similar unfrozen chickens. In some areas of heavy broiler production, both processors and users prefer unfrozen chickens in order to minimize bone darkening. It was found that young broilers may have darkened bones without freezing or cold storing. The highest score received by any fryers on appearance, color, aroma, texture and flavor, after being frozen, was 96 percent, as compared with 100 percent for those that had not been frozen. There was no difference in the scores of frozen and unfrozen hens or roosters.

Kempster and Henderson[4] found that pullets made the greatest gains in weight when 10 to 14 weeks old, followed by a period of slower growth. It has been found that most broilers and fryers are killed during the period of rapid growth when the flesh is tender and moist. This is also the time that the bones are soft and porous and most susceptible to leaching of coloring matter into the flesh.

Bone discoloration was found to be related to not only the age of the chickens and the hardness of bones, but also to increases in mineral content of the bones, especially an increase in calcium. Mitchell et al.[5] published the following figures on the composition of bones of White Leghorn chickens of different sizes:

Sex	Weight, lb.	Calcium, percent	Total ash, percent
Male	1	5.12	13.95
.....	2	6.20	16.47
.....	3	6.43	16.09
.....	4	6.97	16.17
Female	1	5.35	14.81
....	2	6.45	16.74
....	3	7.75	19.74
....	4	7.58	18.01

It has been observed that young chickens which were raised exclusively on low mineral content "broiler mash" developed weak bones when about 11 weeks old, or when they had gained about two pounds. This was noticed by the inability of the chickens to stand for more than a few minutes at a time. These birds would assume a sitting position during eating and drinking. After they were killed, frozen and cooked, the leg bones and flesh were badly discolored.

On the other hand, chickens that were allowed to range on the farm with the mother hen did not develop these symptoms. After they were killed, frozen and cooked, the bones were only slightly discolored.

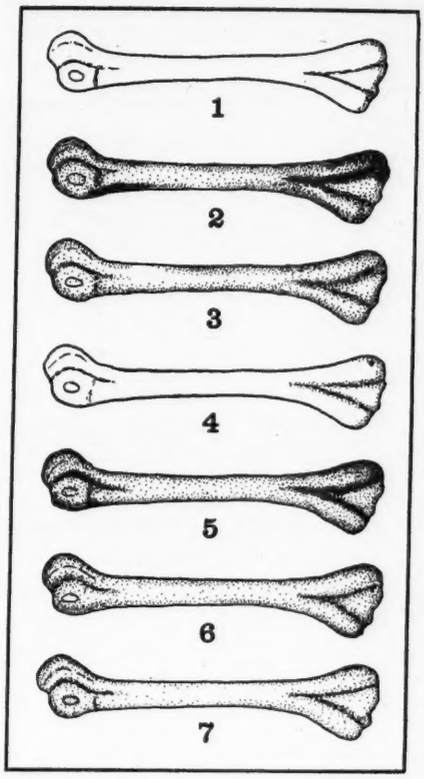
Lansing[6,7] found an accumulation of calcium in the cells as an organism grows older. He found that increase in age, increase in calcium content of the cells, and decrease of permeability of cell cortex, were associated. Aging itself was a result of decreased cellular permeability.

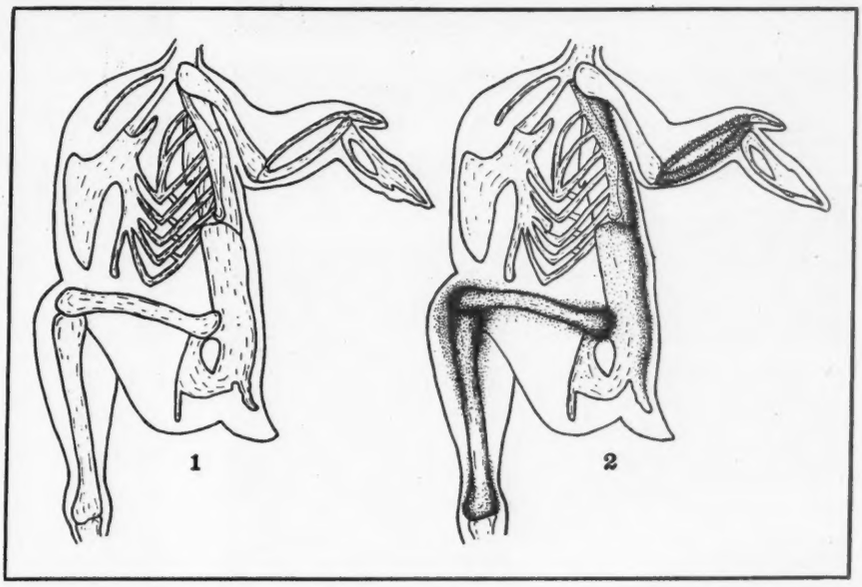
Poor Bleeding

In commercial plants, chickens are hung up by their feet and permitted to bleed for about one minute after their throats are cut and before they are scalded. In homes and many locker plants, chickens are allowed to lie in a box or barrel between the time of beheading and scalding. This results in improper bleeding, which was believed associated with bone darkening.

A comparison was made of identical lots of fryers that were beheaded. One lot was hung by the feet for three minutes before scalding. The other lot was placed in a basket during this period. Both lots were dressed, frozen and stored for one week and one month. They were then defrosted, fried, and scored for desirable appearance, aroma, color, texture and flavor. Those that were well-bled and held one week in

Storage at —15 Deg. F. Prevents Darkening Almost Entirely





SKELETONS (above) of dressed chickens show, left, no darkening and, right, areas of typical bone darkening, at knee joint, along the leg bones and the back.

RELATIVE DEGREE of bone darkening after different treatments (left). (1) Well-bled, chilled, unfrozen; (2) poorly bled, frozen immediately; (3) well-bled, chilled 24 hrs. before freezing; (4) well-bled, cut-up, blanched, frozen immediately; (5) properly prepared chicken, frozen, stored at 15 deg. F.; (6) same as (5) but stored at 0 deg. F.; (7) same as (5) but stored at —15 deg. F. The bones in these cases were removed from the legs or "drumsticks."

storage received a total score of 96 percent. On the other hand, those that were poorly bled received a score of 89 percent. After one month's storage these scores were 90 and 86 percent, respectively.

Clots of blood were found in the large veins of poorly-bled chickens. While these clots discolored the meat, there was also bone discoloration of the type that appeared in the well-bled chickens. The blood that was chiefly responsible for discoloration of the bone and meat in the joints was in the marrow of the bones and was little affected by bleeding. As shown in Table 1, poor bleeding did not adversely affect the flavor, aroma, or texture of fried chickens.

Chilling

Time of chilling did not affect bone darkening. Fully dressed, 12-weeks-old fryers were allowed to chill at 34 deg. F. for 24 and 48 hours before freezing. Examination of the cooked fryers after one and four weeks in freezing storage showed that they were discolored. Discoloration, however, was no worse than in chickens frozen as quickly as possible after being dressed. One fryer was held in crushed ice for five weeks before being frozen. After two months, it had only the usual amount of bone discoloration for a chicken of this age.

TABLE I—EFFECT OF TREATMENTS BEFORE FREEZING on Desirable Qualities of Frozen Frying Chickens.

Pretreatment	Desirable appearance 15	Desirable aroma 10	Desirable color 15	Desirable texture 20	Desirable flavor 40	Total score 100
			In freezer storage 1 wk.			
None	15	10	12 (dark)	20	40	97
Chilled 24 hr.	14	10	12 (dark)	20	40	96
Chilled 48 hr.	13 (reddish)	10	12 (dark)	20	40	95
Blanched	15	10	15	20	35 (bland)	95
Deboned	15	9	15	20	35 (bland)	94
Poorly bled	10 (dark)	10	9 (dark)	20	40 (excellent)	89
			In freezer storage 1 mo.			
Deboned	15	9	15	20	35 (bland)	94
None	15	10	11 (dark)	20	40	96
Chilled 24 hr.	8 (very dark)	10	12 (dark)	20	40	90
Chilled 48 hr.	8 (very dark)	10	12 (dark)	20	40	90
Poorly bled	8 (dark)	10	8 (very dark)	20	40	86
Blanched	15	5 (very weak)	15	20	30 (very bland)	80

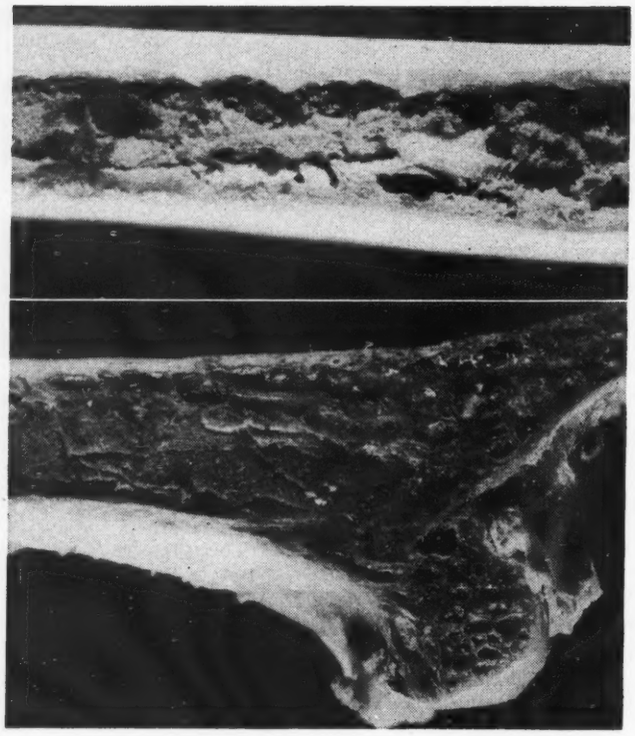
TABLE II—EFFECT OF STORAGE at 0 Deg. F. on the Desirable Qualities of Frying Chicken.

Storage period	Desirable outward appearance 15	Desirable aroma 10	Desirable color 15	Desirable texture 20	Desirable flavor 40	Total score 100
1 week	15	10	12	20	40	97
4 weeks	15	10	11	20	40	96
12 weeks	15	10	11	20	40	96
26 weeks	15	10	10	20	40	95
1 year	14	8	10	20	35	87
5 years	13	5	10	20	30	78
8 years	13	3	10	20	23	69

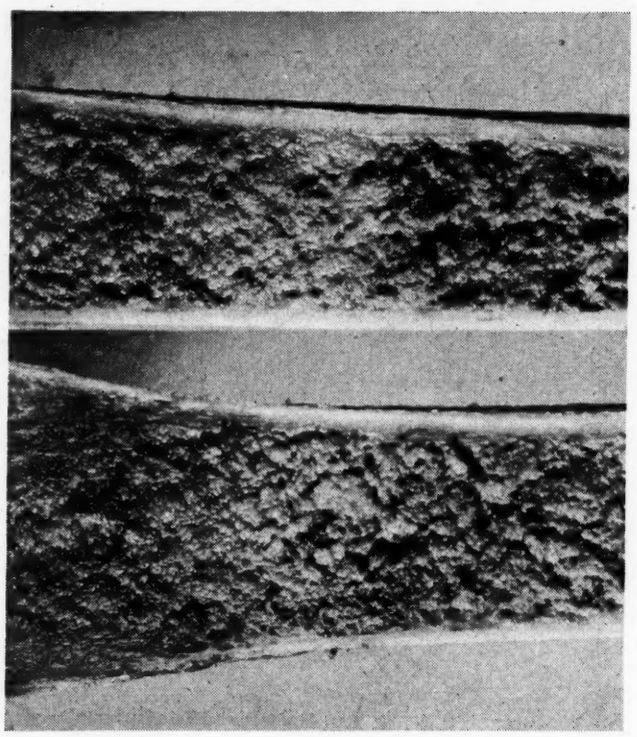
Blanching before freezing prevented bone discoloration, but impaired the flavor. It was believed that bone discoloration might be partly due to enzymes, which could be inactivated by preheating cut-up fryers before freezing. An experiment was made in which the leg joints of fryers were heated to 190 deg. F. for ten minutes by immersing them in cooking oil, then cooling and freezing immediately.

After one and four weeks in freezer storage, the pieces were

Darkening Is Caused by Bloody Marrow Leaching Through Soft Bones



FROZEN HENS. Cross-sections of leg bone after cooking. The upper section shows a white, calcified bone with no evidence of discoloration from the dark colored bone marrow. The lower section of the knee joint shows thin, soft areas through which the bloody marrow penetrated before calcification occurred.



FROZEN FRYER. Cross-sections of leg bone after cooking show discoloration throughout the entire bone as a result of the penetration of bloody marrow through the soft, porous bones. The upper section is through the small part of the bone, while the lower section is through the larger portions of the bone near the knee joint.

fried and examined. There was no discoloration of the meat. The meat, however, was drier and had less flavor than unblanched pieces. Blanching leached out most of the chicken fat, thereby reducing the flavor. It also seemed to coagulate the bone marrow so that it did not leach out.

There was no evidence that enzymes were involved in eliminating discoloration. It was shown that heating chickens before freezing prevented bone discoloration, while freezing and cooking accentuated it.

Storage Temperature

Bone darkening was worse at higher than at lower storage temperatures. White Rock cockerels, 12 weeks old, from the same hatching and feeding, were hung by the feet and killed by cutting the throat. After allowing them to bleed well, they were scalded, dressed, eviscerated, disjointed and frozen at –15 deg. F. They were then divided into three lots and stored at –15, 0 and 15 deg. F.

After six months, samples from each lot were cooked in an oven at 375 deg. F. until tender and then examined for bone darkening. Bones of chickens stored at 15 deg. F. were more intensely discolored along the entire length of the bones than lots held at 0 and –15 deg. F. Bones in chickens stored at 0 deg. F. were badly discolored at the joints, with some discoloration along the entire length of the bones. Bones in chickens stored at –15 deg. F. were only slightly darkened at the joints. When scored organoleptically, the three lots were given ratings of 98, 95, and 85 percent for those stored at –15 deg., 0 deg. and 15 deg. F., respectively.

From outward appearance all three lots of cooked or uncooked chickens were equally good. When the meat was removed from the bones, however, there was a marked difference in the darkening of the bones and adjacent meat. Chickens stored at –15 deg. F. were least discolored. Those stored at 15 deg. F. were about as dark as poorly-bled chickens. Chickens stored at –15 deg. and 0 deg. F. had excellent aroma and flavor, while those held at 15 deg. F. were slightly stale.

These observations indicate that the storage temperature influenced the degree of discoloration of frozen chickens as much as did any other single factor other than age of the chicken at the time of killing.

Bone darkening increased slightly with the length of storage. Storage tests were made with chickens that had received the same treatments during preparation and freezing. Samples were removed from storage, cooked, examined and scored after 1, 4, 12 and 26 weeks. Scores on appearance, aroma, color, flavor, texture were 97, 96, 96, 95 percent, respectively.

Length of Storage

After one week, bone darkening was only slight, occurring mostly around the knee joint. After four weeks, discoloration had increased in intensity and had spread almost the entire length of the leg joints. Darkening increased slightly throughout the 26 weeks of freezer storage, but penetrated the flesh only slightly.

Numerous examinations were made of bone darkening of fryers that had been frozen for one year. In one experiment, examinations were made of fryers that were held at 0 deg. F. for 4, 5, 6, and 8 years. From these examinations there was no indication that darkening increased after the first few months.

Further evidence that bone darkening did not affect the taste of frozen chickens was obtained from this long-time storage experiment. There was no apparent change in aroma and flavor during the time of increased darkening, but after

(*Continued on page* 222)

EDITORIALS

COMMENT AND OPINIONS

New Incentive

SAVING of grain by every practical means is now necessary for good public relations as well as for European aid. In our food plants we have, therefore, a new incentive to prevent every kind of loss and damage.

The toll taken by insects and the loss to rodents and other pests is an alarming total in the United States. Not all of this $400,000,000 loss can be prevented by food-plant or food-storage improvements; but much of it can be.

There are today available pest-control chemicals which far exceed in effectiveness any available before the war. Many of these have been proven in practical use, so that they are no longer of doubtful value. Each plant superintendent should make it his business currently to see that every department is utilizing the best available of methods and control materials. The prestige to his company will in itself be enough of a reward for a job well done. But the benefit will show also in the balance sheet.

Never before has there been such an opportunity to get benefits from improved plant housekeeping and more effective pest control.

Lest We Forget Tin

"DEFICIT Forecast in Tin Production" was the headline of a report of the Tin Study Group after its recent meeting in Brussels, Belgium. In the Far East the estimated deficit in tin production will be 76,000 tons in the next three years.

One can recall the incorrigible optimists of recent years who were certain that tin dredging and mining operations could be resumed promptly after V-J day. This, in spite of definite knowledge that only one good tin dredge was within 7,000 miles of Malaya and that about 3 years would be needed to build any new ones. In fact, one can recall many other failures to interpret facts correctly. Remember the ones who used to complain, "Have you heard of anybody starving" when Washington was urged to get busy on the wartime food problem?

Wrong Peace Propaganda

A MINOR incident in the postwar development of guided missiles illustrates an undesirable byproduct of unwise postwar carping against business. The Chief of Ordnance, U. S. Army, had asked one of the explosive manufacturers if its rocket propellant powder was the best it knew how to make. The answer was an emphatic No. Asked why, the manufacturer said he was sick and tired of being labeled a war monger and merchant of death. He refused to be identified in any way with rocket development.

It parallels another incident in 1939 when all well informed people realized war was imminent. A high official of the War Department implored a chemical manufacturer to keep one smokeless powder plant in operation lest the art be lost. The manufacturer was understandably reluctant to comply after the excoriations he had received from the Nye Committee. Thus our national security slowly deteriorates by silly attacks from within.

Upon the absurd conflict between opposing political ideologies is stopped, the wiser course is to "keep our powder dry."

What's Research Worth?

FIGURES from the USDA may answer the question of what's research worth. Using hybrid corn as an example, USDA has spent $5,000,000 in the last 30 years experimenting with corn hybrids and the several states have spent a comparable sum. From this $10,000,000, however, farmers of the nation are reaping $750,000,000 every year out of higher yields and better grain.

In the case of livestock research, the development of phenothiazine for controlling internal parasites in livestock has really proved that research pays back a thousandfold. The cost of the work on phenothiazine was $10,000; now the yearly saving in cattle, horses, sheep and hogs is estimated at $10,000,000.

Or, looking at savings from another angle, it can be said that research has given us 100 lb. of beef for a dime. Cattlemen find that DDT used as a 0.25 to 1.5 percent water solution spray on livestock will increase both meat and milk yields by giving cattle relief from such pests as horn flies. Since it is calculated that one pound of DDT will put 1,200 and 2,300 lb. of beef on treated steers, it follows that each dime's worth of DDT will produce about 100 lb. of beef.

Properly steered, research pays off.

Unsolved Problem of Separation

THERE is need for a practical mechanized method of sorting oysters in the shell as they come from their beds, or from oyster "farms," mixed up with mud, sticks, stones, old shells, and all the miscellany usually dredged off the bottom of shallow salt waters.

In prewar days it was done by hand. Experienced crews of sorters could tell at a glance whether a dark object on a moving inspection belt in a shore plant was a good oyster, a drill, a rock or an empty shell. The wage rate was not particularly good and the work was not only seasonal, but it was wet, cold and dirty. Nevertheless the same sorting crews were available year after year and were fairly efficient.

Oyster companies lost most of their help dur-

ing the war. They could not compete with the munitions industry even when shucked oysters fetched 70 cents a pint at retail. New sorters had to be trained, but, in spite of the best efforts, the green inspectors permitted too many good oysters to go to the dump with the trash. Yield has gone down so low that it is almost impossible to make any money at prices the public will pay for oysters.

The only way out seems to be mechanization but it is a difficult task to accomplish. Oysters do not slide easily. The edge of the valves is very fragile and, once chipped, the oyster soon dies and spoils.

Offhand it would seem as if specific gravity separation would work, but nobody seems to have tried it. Here are some basic data supplied by Fish and Wildlife Service Laboratory at Milford, Conn.:

	Sp. Gr.
Adult oysters, healthy	1.85
Old oysters, badly eaten by sponge	1.72
Empty shells	2.32
Drills	2.07
Stones	2.81

Brine separation at the foregoing densities is out of the question, but it might be possible to use a modification of the Chance Cone to produce an *apparent* density of the right figure by a suspension of sand in moving water. This method is used to separate coal from rock in mixtures, the coal floating off and the rock remaining at the bottom.

The only difficulty with the preceding idea for an experiment is that a small Chance Cone has never been built. Present installations for coal separation are huge. Nevertheless the idea of the suspension of sand in moving water holds more than a hint of a possibility if somebody wants to try it. Even if a clean cut separation could not be made, it would seem possible to mechanize enough benefits to make it worth while trying. Such beneficiation, though seldom practiced in food processing plants, is common in the metallurgical industry.

The job will not be easy but it should be profitable—if it can be done, particularly if it can be done aboard the small oyster vessels.

Promising Army Research on Bread

IF you are one of the fortunate few who have sampled the new experimental foil-packaged Army breads enriched by 3 percent of treated brewers yeast, you have enjoyed a gustatory treat as well as an exceptionally nutritious food. While our guess is that something resembling this bread would enjoy repeat consumer sales, there is another possibility that attracts one's attention.

This yeast enriched bread has delayed staling. We have eaten week-old samples made in the Food & Container Institute of the Armed Forces and have found the bread not only flavorsome but very nearly fresh.

Anyone seeking novelty would do well to explore the flavor improvements possible through brewers yeast as an added ingredient. And if the delayed staling is sufficiently delayed in commercial baking there is the further possibility of removing bread from the category of the most perishable food to the second or even third position. If the latter were achieved, it could easily have an important effect on present bread distribution practices and point the way to greater economies.

End of 57?

QUITE a surprise was in store for those who visited the exhibit that accompanied the dedication of Associates of the Food & Container Institute of the Armed Forces in November. H. J. Heinz Co. showed an entire new line of postwar processed foods ranging from canned roasted coffee to desserts and toppings. While we did not count every item, in retrospect it seemed as if the new foods, many of which are not yet on the regular market, numbered at least 57.

Efficient Use of Corn

WET corn millers have a good record for conversion of a food raw material into high values and with a minimum of economic loss. Roughly two-thirds of the corn entering the process becomes human food. The other third goes back to the farmer in the form of high protein cattle feed.

Compared to this achievement the farm animal is a piker taking about 10 lb. of corn for every pound of edible product it produces.

There are times when man is able to beat nature for efficiency, and this is an outstanding example.

Old Foods

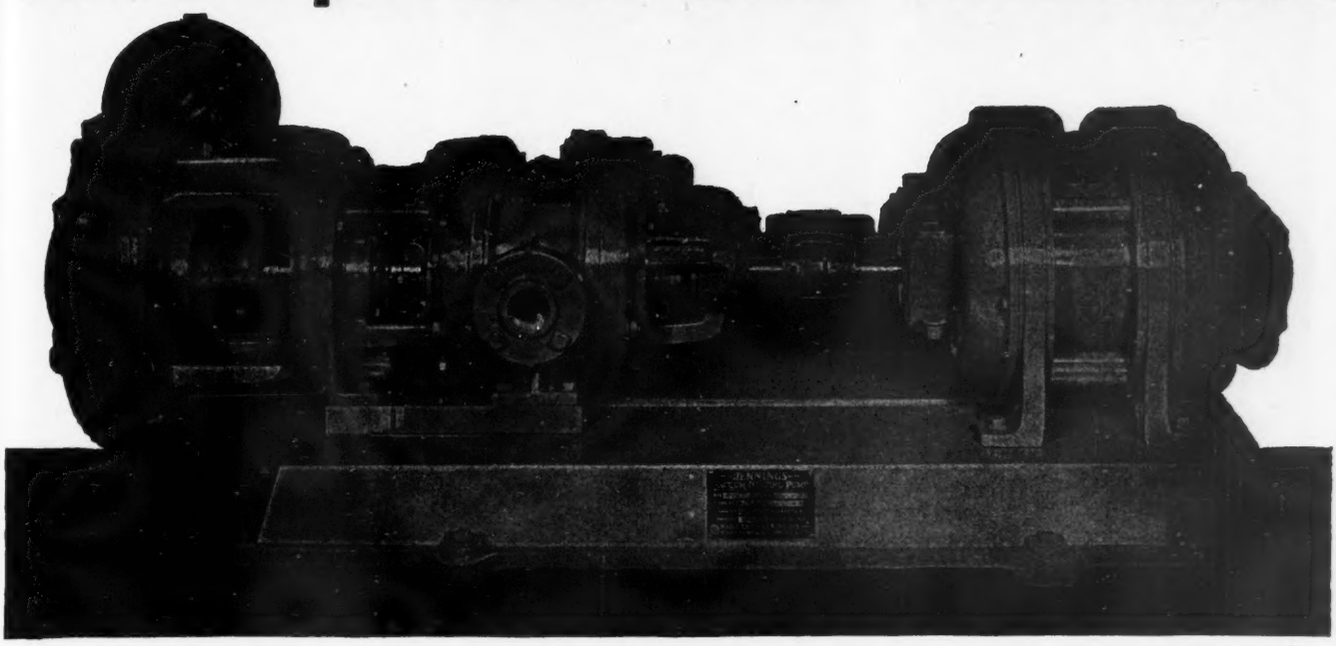
YOU may be interested in how long processed foods remain edible. Some types are very long lived. Others are very short. In many of the long lived foods the life is determined by the life of the package itself. In others, the deterioration or breakdown goes on despite the package. Here are a few examples of old foods:

General Foods recently discovered a 31-year old bar of Bakers Premium No. 1 chocolate in a West Newton, Mass., home. Tested in the control laboratories it was found to have a "good flavor, considering its age," no excessive fat bloom, and only a small deterioration of color and texture.

Some years ago, Libby, McNeill & Libby discovered a large square can of corned beef in a store in Britain. Returned to Chicago, it was found the can was more than 30 years old. Its contents were in excellent condition.

Likewise, a can of sweet corn packed 50 years previously by Elgin Canning Co. proved to be perfect though not as delectable as current packs because no sugar had been added.

Nash—the Perfected Vacuum Pump for Evaporators and Condensers

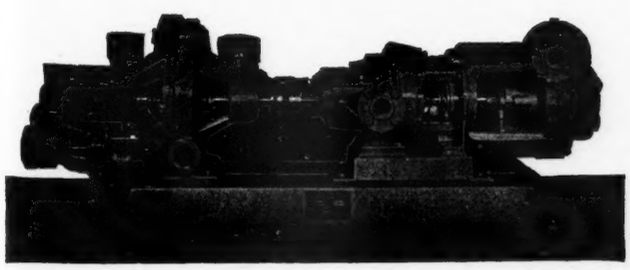


COMBINATION VACUUM REMOVAL UNIT ESPECIALLY DESIGNED FOR SATISFACTORY OPERATION ON CONDENSERS WITHOUT BAROMETRIC LEG

Especially designed for drawing air and liquid from high vacuums, the Nash Vacuum Removal Unit is an efficient combination of a standard Nash Vacuum Pump and a Jennings Centrifugal. This design may be had in either motor or steam turbine drive, and may be installed with confidence that it will operate perfectly.

Nash Vacuum Pumps for Evaporator and Condenser Service offer unusual advantages. Vacuum is non-pulsating, producing uniform operating conditions and assuring a better product. Nash Vacuum Pumps have no valves, gears, pistons, rings, or mechanical complications. The single moving element rotates without metallic contact, and no internal lubrication is required. In standard design these pumps maintain vacuums up to 27" of mercury.

Nash Pumps are compact, and require but a fraction of the space taken by old type equipment. They may be installed where convenient, and they operate at suitable speeds for direct connection to either electric motors or steam turbines. Nash engineers will be glad to recommend proper equipment to exactly meet your particular requirements.



THE NASH VACUUM REMOVAL UNIT MAY BE HAD EQUIPPED WITH STEAM TURBINE DRIVE WHERE THIS TYPE IS PREFERRED

NASH ENGINEERING COMPANY

SOUTH NORWALK • CONNECTICUT, U. S. A.

NEW PACKAGES & PRODUCTS

Hunters' Pink Is Used for These Striking Meat Packages

A COMPLETE new package line recently was introduced by Hunter Packing Co., East St. Louis, Ill., at a gala party preview for retailers in St. Louis.

Especially designed for self-service merchandising, each package carries recipes and a special pricing panel to assist retailers in pricing the products.

Featured in the new Hunter line are one pound units of wieners, frankfurters and pork sausage which are machine wrapped in printed Cellophane. The company also introduced a new package development for small bricks of chili con carne. The unit consists of a pan made of printed aluminum foil. Chile is poured into the aluminum foil pan in a molten state. The rapid heat transfer of the foil makes it possible to chill the product so quickly as to prevent the usual separation of meat and the fats and juices. A tear tab is provided for easy opening.

Bright pink and white with black accents are used for all the packages. The redesigned Hunter trademark is played up distinctively on top, bottom and sides. The word Hunter appears in bold black letters just below it. Product name is in white on red background.

The 1-lb. units consist of setup, push-in boxes made by Acme Folding Box Co., St. Louis. Machine-wrapped with Cellophane and printed in three-color rotogravure by Milprint, Inc., Milwaukee, the packages carry right into the home the company identification of the meat products.

Sliced bacon is sold in a package comprising an outer sheet of sulphite laminated to opaque glassine. The bacon is placed on the back cover and the outer covering folded in and over, forming a book-like container.

The new color scheme and design are used for cooked and smoked hams, picnics, slab bacon, loaves and sausages and lard.

Jim Baker & Associates, Milwaukee, designed the entire line.

Cugat Endorses Nugats

AN avalanche of advertising and publicity has accompanied the candy product recently introduced by L. R. Stone Co., Inc., Los Angeles, and endorsed by Xavier Cugat.

Named Cugats Nugats and proclaimed as "The Candy of the Stars," the confection is described as a whipped cream nougat with California almonds, topped with a layer of fresh coconut and colored and flavored with natural fruit puree. It is coated with either light or dark chocolate. Flavors include pineapple, orange, raspberry, lemon, strawberry, vanilla and rum. Each 1-lb. box contains an assortment of all seven flavors. Flavors are designated on the inside of the box at the end of each row of candies.

The box was designed by Cugat. It is shocking pink with white and black lettering and a caricature of Cugat and miniature sketches of Cugat as a candy maker on all sides of the carton. Boxes are distributed in 1-lb. and 4-oz. sizes.

Rolls by Pillsbury

PILLSBURY MILLS, INC., Minneapolis, is distributing nationally a new hot roll mix, which requires only the addition of water to make a wide variety of yeast-raised dinner and breakfast rolls.

The package contains enriched flour, sugar, shortening, non-fat dry milk solids, salt and dried yeast in a separate small envelope. The contents will make from 12 to 18 rolls with the addition of one cup of water.

Sales of the product are being backed by an extensive advertising campaign. The company also within the last year has placed on the market a prepared pie crust mix.

New Soup

TOLEDO, OHIO, has been selected by Campbell Soup Co., Camden, N. J., as the test area for its newest soup, cream of chicken.

Toledo was chosen as being representative of the best type of market for the merchandising of a new product.

It is reported that the company has spent almost two years of intensive laboratory experiment and kitchen testing on the formula.

Love That Mix—Aunt Jemima's Doing It, Too

SINCE 1889, when the first pancake mix was placed on the market by The Quaker Oats Co., Chicago, Aunt Jemima has clung faithfully to that product alone. Now, however, her fame and name appear on cartons of mixes for corn muffins, oatmeal cookies and white cornbread. All these products are being produced in a pilot plant in Akron, Ohio, and are being test marketed.

James Nash has designed the clay-coated cartons made by American Coating Mills, Elkhart, Ind. The design aims to achieve a family relationship through the Aunt Jemima trade-mark, uniform display of product name and the familiar slogan, "Add Water—That's All!"

The mixes are packed in laminated glassine liners inside the lithographed cartons. A Pneumatic Scale Corporation double package maker is used for the final sealing.

The types of ready mix have been emphasized on the carton by color illustrations of baked products and by large type. The reverse side carries illustrated instructions for best baking results.

Packaged Frostings Are Easy to Use

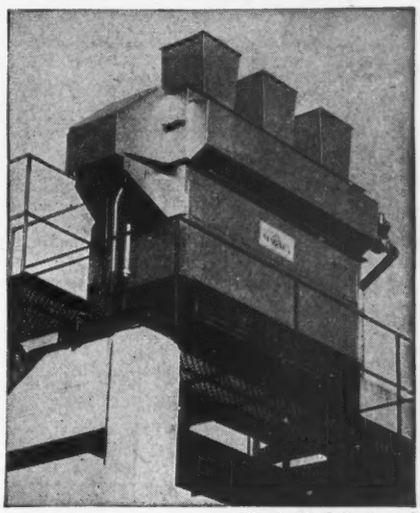
THE housewife now can frost her cake speedily and easily by using a package of Q-T Frosting. It comes in three flavors, chocolate, vanilla and strawberry.

The 4½ oz. package contains enough frosting to cover top and sides of one 8 inch cake or 12 large cup cakes. Ingredients of the mix include sugar, shortening, skim milk powder, pure and imitation flavors and salt. No cooking is required and water is the only addition to be made.

The mix is wrapped in a glassine bag and protected by an outer carton. The color scheme is pink and white for strawberry, blue and white for vanilla, and brown and white for chocolate. Black accents

NIAGARA *AERO-PASS CONDENSER

With Oilout, Duo-Pass and Balanced Wet Bulb Control



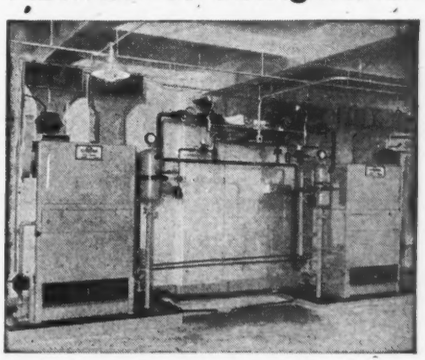
*Trade-Mark Registered

Increases refrigeration capacity and plant production. Saves power and water consumption. Essential exclusive features:

1. "Balanced Wet Bulb Control" holds compressor head pressure at the minimum—saving power.
2. "Oilout" prevents oil accumulation in refrigerant—assuring full capacity.
3. "Duo-Pass" precooling coil eliminates scaling of condenser coils—assures uninterrupted service at full capacity.

Write for Bulletin 101-FI

NIAGARA "NO FROST" METHOD of Refrigeration



With the NIAGARA "NO FROST" Method you always have full capacity with never any refrigeration loss from frosted coils.

Write for Bulletins 83-FI and 95-FI

NIAGARA BLOWER COMPANY

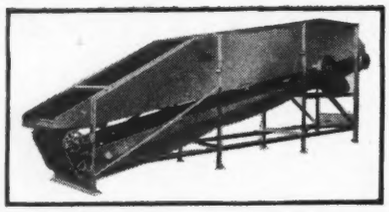
Over 30 Years of Service in Industrial Air Engineering

405 Lexington Ave., New York 17, N. Y.

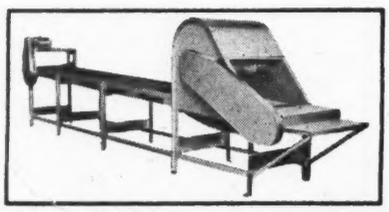
Field Engineering Offices In Principal Cities

NIAGARA

AIR ENGINEERING EQUIPMENT

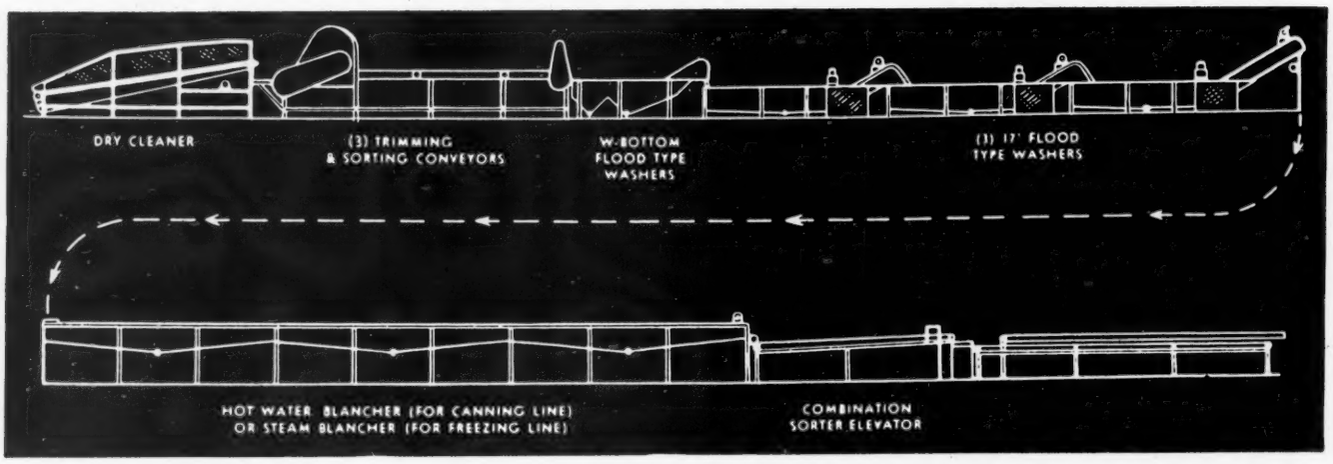


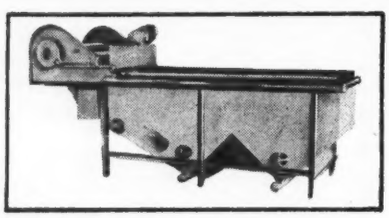
1. Dry Cleaner



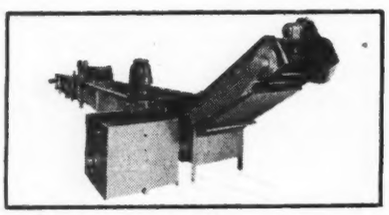
2. Trimming and Sorting Conveyor

The Speedy Way
The Better Way
To Clean Vegetables
...for Canning
...for Freezing
The "FMC All-Purpose Vegetable Line"

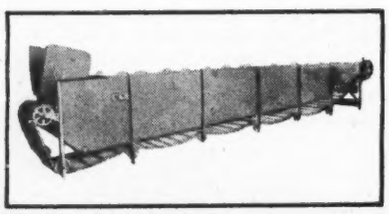

DRY CLEANER
(3) TRIMMING & SORTING CONVEYORS
W-BOTTOM FLOOD TYPE WASHERS
(3) 17' FLOOD TYPE WASHERS
HOT WATER BLANCHER (FOR CANNING LINE) OR STEAM BLANCHER (FOR FREEZING LINE)
COMBINATION SORTER ELEVATOR



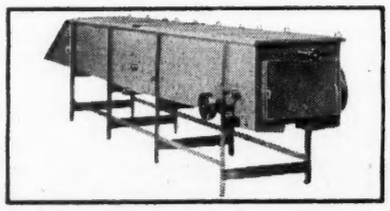
3. W-Bottom Flood Type Washer



4. 17' Flood Type Washer



5. Hot Water Blancher



5a. Steam Blancher

6. Combination Sorter-Elevator

For Broccoli, Cauliflower, Brussels Sprouts, Rhubarb, and other leafy vegetables including Spinach . . .

Free leafy vegetables from dirt, grit, and other foreign matter speedily, efficiently, and economically with the FMC All-Purpose Vegetable Line.

Remember . . . clean vegetables are Premium vegetables . . .

When the FMC Line is used for preparing Spinach, a dry cleaner is added, as well as a rotary fork attachment for each trimming and sorting conveyor.

The Line as shown has proven highly successful in some of the largest and most modern processing plants in the United States. Plan now to join them in 1948 . . . and thus step up your quality and cut your costs.

FOOD MACHINERY CORPORATION

ANDERSON-BARNGROVER DIVISION
Branch Offices: SEATTLE • PORTLAND • LOS ANGELES
General Sales Office SAN JOSE 5, CALIFORNIA

SPRAGUE-SELLS DIVISION
Branch Offices: NEW YORK CITY • BALTIMORE
General Sales Office HOOPESTON, ILLINOIS

are used to make the printed matter more effective. The Q-T identification appears prominently on all sides of the carton. Explicit directions for preparation appear on the back.

The manufacturer is The Taylor-Reed Corp., Glenbrook, Conn.

Frozen Pack Label

NORTH PACIFIC CANNERS & PACKERS, INC., Portland, Ore., has redesigned the label for its consumer sized frozen packs.

Five color rotogravure on high sheen Cellophane features a natural color pictorial of the product against a bright chrome yellow background. The brand name, "Flav-R-Pac," is done in bold white letters on a dark background. Other important words, including Fresh Frozen and the product name, are in dark bold letters on a light background. Product identification appears on all sides of the carton.

Streamlined Beer Package

THE new one-way, no-deposit beer bottles, now produced in large quantities by Owens-Illinois Glass Co. plants in California, are being distributed by Bohemian Distributing Co. in convenient carry home cartons.

Known as the "Handy Pak," the new carton is applauded by both retailers and consumers because it saves bags, paper and wrapping time for the grocers and is light and convenient for the consumer to carry with little danger of breakage.

The new carton likewise encourages the patron to buy a dozen bottles rather than three or four at a time.

The corrugated carton is equipped with partitions that hold the bottles securely in place.

Acme Brewing Co., Los Angeles, is said to be the first company to come out with beer in non-returnable bottles as well as the first to introduce a 12-bottle carry home carton.

Wraps with or without Cardboard or Tray

NEW UNIVERSAL MODEL 4
WITH SPECIAL INFEED CONVEYOR

Another new "PACKAGE" development

All of the different types of wraps shown above can be made on a single Universal Model 4. Crackers such as the saltines, square chocolate sandwiches and cocoanut cookies illustrated, can be wrapped without cardboard or trays. Other products, like the Rosettes and round crackers require trays.

The machine wraps all these items without extra change parts. When switching from one size to another, the operator merely inserts a roll of wrapping material of the correct width and a different size pusher plate, the changeover taking only two to five minutes.

Can be equipped with labeling unit which prints date, price, etc., on labels and seals them to top of package.

Speed, up to 55 per minute.

Self-measuring Paper Feed

The Universal Model 4 features a new self-measuring paper feed that measures the overall bulk of each package in the wrapping process. In changing from one size package to another, only one hand-wheel adjustment is necessary. Tightness of wrap can be regulated to suit the needs of the product. Adjustable for packages 6" to 18" or 4" to 16" long, and 2½" to 7½" wide.

Write for complete information

PACKAGE MACHINERY COMPANY • Springfield 7, Massachusetts

NEW YORK CHICAGO CLEVELAND ATLANTA DENVER
LOS ANGELES SAN FRANCISCO SEATTLE TORONTO

PACKAGE MACHINERY COMPANY

Over a Quarter Billion Packages per day are wrapped on our Machines

It's really very simple . . .

TO GET ALL THE ADVANTAGES OF ENDURO STAINLESS STEEL

Improved Appearance
Easy to Clean
Strong—Long-Lasting
Sanitary Surfaces
Non-Contaminating
Resistant to Rust and Corrosion
Resistant to Heat
Easy to Fabricate
Low Ultimate Cost

INSPECTED INSIDE AND OUT
—no hidden defects

FLAT-ROLLED STEEL
—means uniform wall thickness

COLD-FORMED INTO TUBING
—assures freedom from scale

100% WELD
—as strong as any point in the wall

Plus THOSE OF THE ELECTRUNITE PROCESS OF TUBE MANUFACTURE . . .

Just specify

Republic
ELECTRUNITE
STAINLESS STEEL TUBING

REPUBLIC STEEL

REPUBLIC STEEL CORPORATION
STEEL AND TUBES DIVISION • CLEVELAND 8, OHIO
Export Dept.: Chrysler Bldg., New York 17, N.Y.

Window Package

CASCADE FROZEN FOODS, INC., Seattle, is marketing frozen corn on the cob in a new Cellophane-window package, designed jointly with the Marathon Corp. The package bears the Agen brand name and item names in bright yellow, high-lighted with an equally bright blue. Cooking instructions and guarantee appear on the back of the carton, containing two ears of frozen corn.

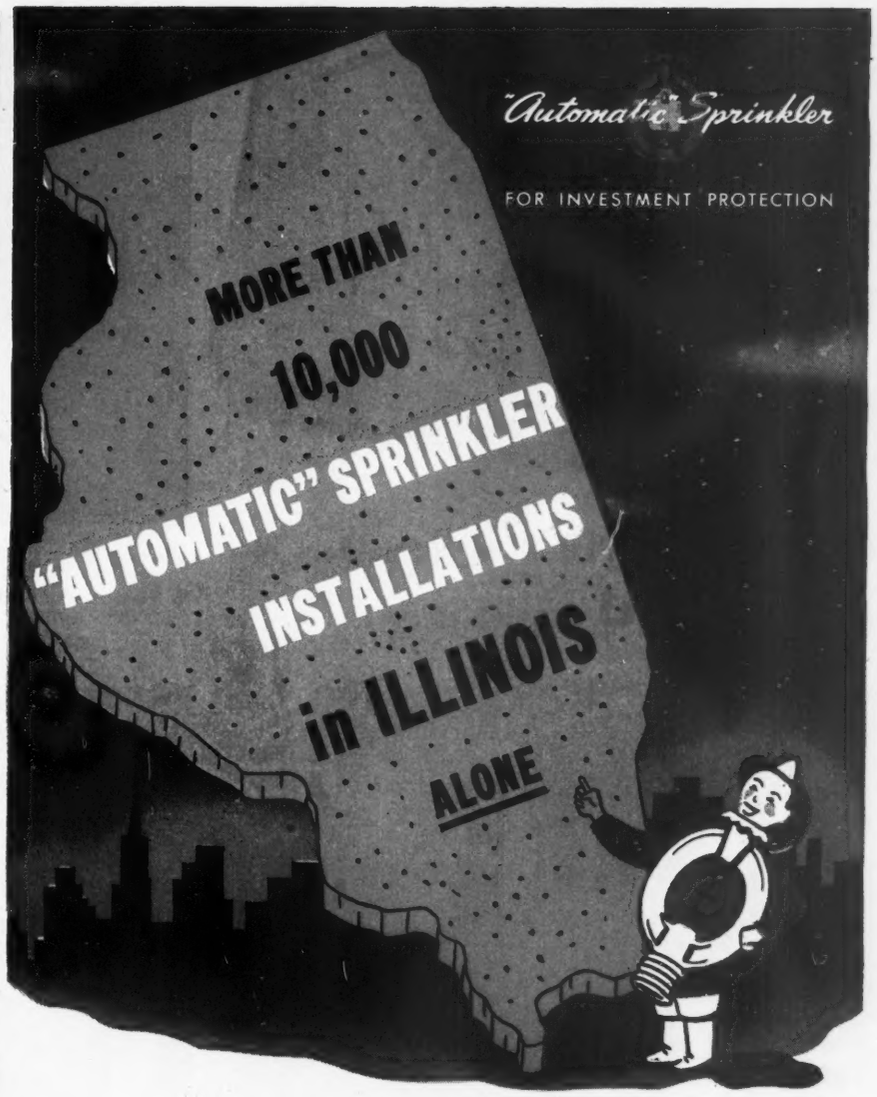
First window-type carton that Cascade has marketed, the package was designed to increase sales appeal of corn on the cob and to create a faster packing operation in the plant. The rectangular units can be stacked more easily in the retailer's display case than can a Cellophane bag or an individually wrapped ear of corn, Cascade's previous type of packaging for the product.

Spode Sets the Theme

THREE candy products by Harry Brown Confections, Tacoma, Wash., now are being distributed nationally in a series of new 1-lb. packages.

The foil-wrapped products are placed in vacuum-packed tins bearing the 167-year old "Tower" design originated by Josiah Spode for English dinnerware bearing the Spode name.

"Pink Tower" is used for Almon Omega, a butter brittle coated with milk chocolate and ground almonds; "Blue Tower" holds Pecan Caramel Rolls, and "Brown Tower" protects Pecan Parisian Creams.



Insurance Policies don't prevent fire...
They pay for it!

Surely it's just as consistent for you to gamble with fate by not carrying insurance, as it is to ignore the necessity of "Automatic" Sprinkler Investment Protection.

Your company's progress . . . yes, even its survival, is dependent upon wise investment . . . continued operation. Loss by fire is never confined to the investment in visible destruction of buildings and equipment. Factors of even more importance to business stability and success lie behind the scenes of apparent damage — factors that frequently involve the very existence of business itself.

It's safe and economical to anticipate fire, and whether your business be in Illinois or elsewhere in the Western Hemisphere, you'll find "Automatic" Sprinkler **an important investment today . . . perhaps welcomed protection tomorrow.**

"Automatic" Sprinkler

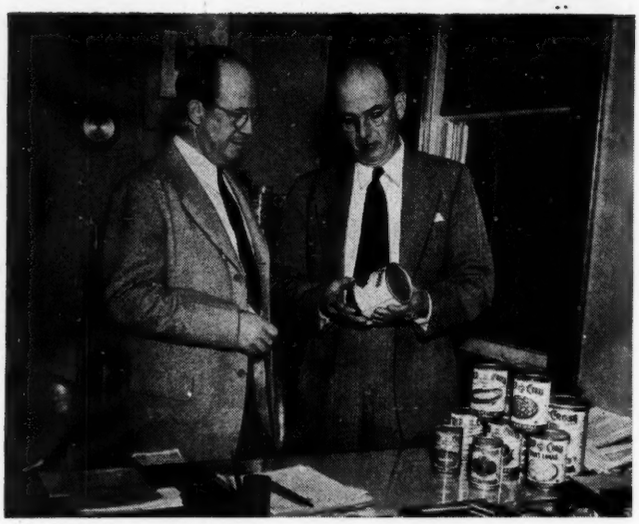
FIRST IN FIRE PROTECTION

DEVELOPMENT · ENGINEERING MANUFACTURE · INSTALLATION

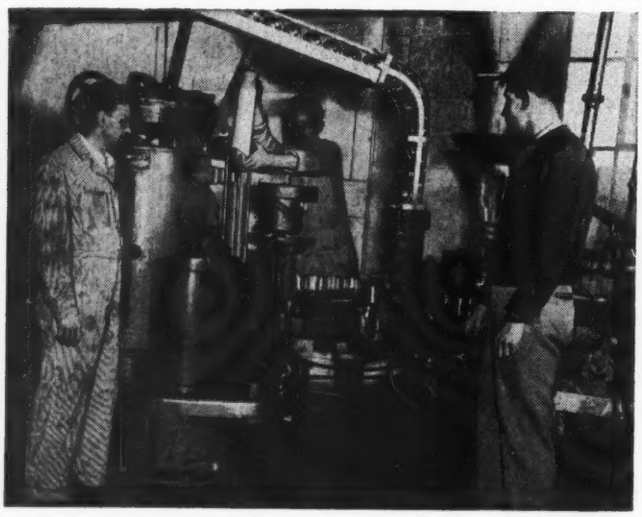
"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA
YOUNGSTOWN 1, OHIO
OFFICES IN PRINCIPAL CITIES OF NORTH and SOUTH AMERICA

CANNERS LIKE CROWN SERVICE...

CHARLES B. SILVER & SON, packers of Red Cross Brand of Vegetables.

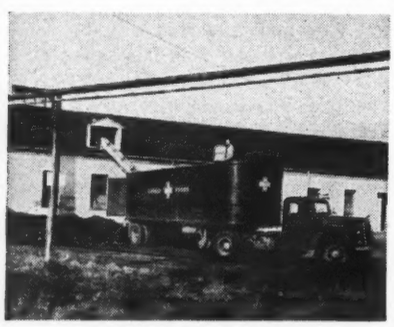


Mr. G. Bartol Silver (right), Directing Head of Charles B. Silver & Son, conferring with Ray Taylor, Crown Can Company representative, in the Havre de Grace, Maryland, office of the canning company.



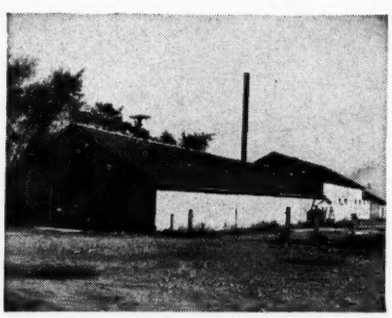
Scene in the Christiana, Pennsylvania, plant. Crown's service man, Mike Dembeck, with plant superintendent Walter Kohout.

Another view of operations in the Christiana plant.



Truck unloading at Christiana.

General view of the Leslie, Maryland, plant of Charles B. Silver & Son.



The company's three canneries are strategically located. This is the Havre de Grace, Maryland, plant.

ONE OF A SERIES FEATURING CROWN CAN CUSTOMERS

CROWN CAN

THE NATION'S THIRD LARGE SOURCE OF SUPPLY

CROWN CAN COMPANY • PHILADELPHIA • Baltimore • Chicago • St. Louis • Houston • Orlando • Fort Wayne • Nebraska City

FOOD INDUSTRY NEWS

GENERAL

Economic Reports On Foreign Aid Hold Key to Business Outlook

Harriman, Krug and Nourse reports provide a chart from which to plot a course in carrying out Marshall Plan

CONTROVERSIAL statements on foreign aid have come rapidly as emergency food programs for Europe were proposed and debated in Washington and throughout the country. The tug-of-war got under way over the size and scope of the Marshall Plan—or the European Recovery Program, as the Administrator prefers to have it known.

The confusion attendant upon these debates has obscured to some extent three tremendously far-reaching research efforts that analyzed the Marshall Plan requests.

The Harriman report, officially entitled "European Recovery and American Aid";

The Krug report, "National Resources and Foreign Aid";

The Nourse report produced by the Council of Economic Advisors, called "The Impact of Foreign Aid on the Domestic Economy."

Harriman report: This is perhaps the most useful. It recommends quantities of particular commodities and equipment that the U. S. should send abroad to aid Europe.

More, it comes close to being what the final Administration foreign aid program may be. It also recommends particular control actions which may be imposed on food and other industries to further the European recovery program.

Part three of the Harriman report is of special interest to the food industry. Its special sections analyze in detail the impact of foreign aid on specific industries, including food, agricultural machinery, equipment, and transportation. Superintendent of Documents, Washington, D. C., sells the report for 60 cents.

Krug report: This report evaluated the impact of foreign aid on U. S. raw materials, manpower and production facilities. It too lays clear the statistical bones underlying current U. S. production and export problems, and poses the problems in clear readable terms.

Nourse report: Less valuable than either of the above reports, this report spells out what the group has found to be the potential dangers to the entire economy that stem from an extensive foreign aid program laid on top of unprecedented domestic demands. Its title: "Impact of Foreign Aid on the Domestic Economy," available from the Council of Economic Advisors, Washington, D. C.

The Herter special House subcommittee on foreign aid, which toured Europe between sessions, has also printed a dozen or more special reports on miscellaneous aspects of foreign aid—but they're not comparable to the rounded studies done by the reports noted here.

Food Plant Operations Fit Into Labor Law

THE TAFT-HARTLEY law is beginning to have its effect on labor relations in the food industries. Of greatest influence is the requirement that union officers must file non-communist affidavits with the National Labor Relations Board before the union may use NLRB machinery for election purposes or to bring unfair labor practice charges against employers.

Many CIO unions, including the left-wing United Packinghouse Workers and the Food, Tobacco, Agricultural and Allied Workers, have not complied with the affidavit requirement and thus can have no recourse to NLRB. On the other hand, most AFL unions have complied and are using the law.

In one of its first policy decisions, NLRB has refused to order Plankinton Packing Co., of Milwaukee, to bargain with the United Packinghouse Workers because the union has no standing before the board. In 1946 NLRB had certified the union, which already had a contract covering production workers, as bargaining agent for the company's office employees. But the company has since refused to bargain with the union because it considered it improper for the same union to represent both the production and office personnel.

In another case involving the CIO Packinghouse Workers, NLRB has refused to certify the union as bargaining agent for Wilson & Co. production and maintenance employees and truck drivers at Jacksonville, Fla., although the union won an election on August 20, two days before the Taft-Hartley provisions became effective.

If this situation continues, it will be a boon to the rival AFL Meat Cutters and Butcher Workmen and the International Brotherhood of Packinghouse Workers (Ind.), both of which are in compliance with the new labor law. NLRB will permit only a complying union to have a place on an election ballot.

HUGE COOLER

Welcome to the frozen food industry, this superimposed architect's drawing shows what is expected to be the world's largest refrigerated warehouse. The building will be completed in late summer, at Dallas, Tex.

FAO TAKES OVER WITH LITTLE CHANGE

AFTER much worrying in Washington about "changing horses in the middle of the stream," the International Emergency Food Council voted to disband itself and immediately become the International Emergency Food Committee of the Food and Agricultural Organization.

While the maneuvers on an international scale have seemed to have little practical import, the general fear was that the effectiveness of the IEFC, in allocating food commodities from surplus nations to needy nations, might be hampered in its conversion from one status to another.

Among the questions resolved was that the various commodity committees would be available to deal with problems of surpluses, once the question of allocating short supplies is overcome by revival of food production throughout the world.

Another move has strengthened the hand of the U. S. in the new IEFC setup. The secretary-general of the new IEFC will have a place on an official advisory group to the FAO director-general. This group is expected to iron out and decide disputes that arise from conflicts over commitments, procedures, etc., between countries that differ over who gets **what.**

Center Opened For Materials Handling

THE materials handling division of the Yale and Towne Mfg. Co. recently opened a five-story building to provide industries in the New York metropolitan area with complete materials handling, technical and sales services. With these facilities available, the company will inaugurate a new national distribution program for the hoists, scales, industrial trucks and other materials handling machinery that it manufactures.

In addition to sales engineers who generally staff a manufacturer's regional sales headquarters, the new building will accommodate the following:

1. A showroom where many types of materials handling machinery can be observed and operated by users.

2. A materials handling garage staffed by experienced technicians and equipped to provide repair and maintenance service. The garage is equipped, for example, with a paint spray booth, welding equipment, spare parts and a complete set of repair tools.

3. Educational facilities including motion pictures and library textbooks on materials handling, plant organization, industrial management, Navy material handling manuals and manufacturers; literature on different materials handling equipment.

Samuel W. Gibb, general sales manager of the Yale and Towne Philadelphia division, stated that his company plans to establish in each major market in the country not only experienced sales engineers but also excellently equipped materials handling maintenance garages and show rooms staffed with skilled technicians.

Line of Succession

COMPLYING with the Administrative Procedure Act of 1946, the Food and Drug Administration has published the order of delegation of final authority by the Commissioner. In the absence of Paul B. Dunbar, Commissioner of Food and Drugs, final authority is delegated to Charles W. Crawford, Louis D. Elliott, George P. Larrick, Henry Welch, Donald C. Grove, and William R. Jester.

FOOD ADULTERATION

A TEXAS Court of Criminal Appeals has ruled that the State Health Officer has no authority to determine, as a matter of law, what constitutes adulteration of foods.

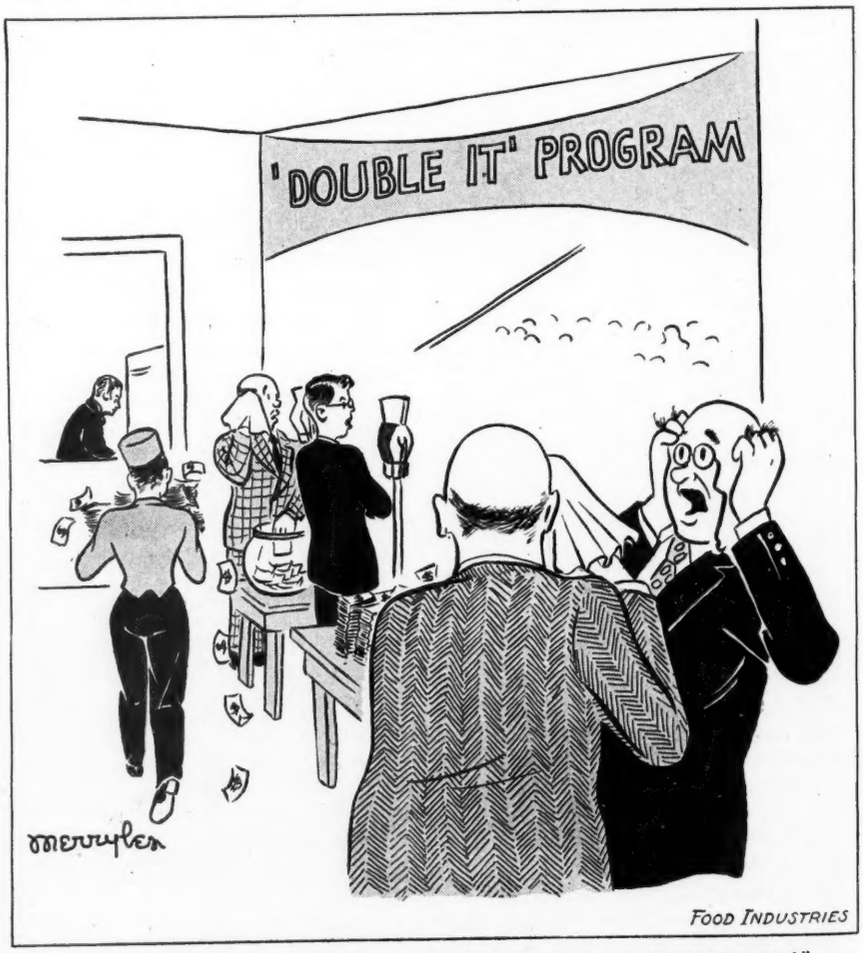
The case upon which the ruling was given was that of A. A. Margolin, convicted, in Harris Co., on a charge of violating the pure food and drug law by the alleged manufacture and sale of soda water containing saccharin. The appeal court ordered judgment reversed and cause remanded.

Nutrition Grants

GRANTS-IN-AID totalling $1,510,713 for fundamental research in the science of nutrition have been made to date by The Nutrition Foundation, George A. Sloan, president, recently reported.

Grants have been made to 57 universities and medical centers in the United States and Canada, Mr. Sloan stated. The foundation has been enabled to make the grants from subscriptions, totalling $3,000,000, from large and small companies in the food industry.

The foundation was incorporated in December, 1941.



"IF HE KEEPS ANSWERING, KRISPY FLAKES IS BANKRUPT!"

Research and Marketing Projects Get Underway

MOST of the research and marketing projects to be authorized this fiscal year under the R. & M. Act of 1946 have now been officially approved and work is getting underway in the various bureaus of Agriculture. There will be additional projects started from time to time, particularly if the program grows each year as originally intended when legislation was enacted by Congress.

Research and marketing projects are also being started under contract between the Department of Agriculture and "such public or private organizations or individuals" as may be found qualified to carry out these projects "more effectively, more rapidly, or at less cost than if performed by the Department of Agriculture."

A number of service type contract-projects have been approved, and contracts were being drawn up during November. These projects include such subjects as the bread-baking quality of wheat, and deterioration of bakery products.

Other Projects

Also approved during November were a number of research type contract-projects on cotton, on *Salmonella* in egg products, and on production of animal feeds from vegetable canning wastes. Sponsors for these research contracts are principally the Bureaus of Chemistry and Plant Industry. Potential contractors interested in these subjects are being interviewed.

Review of the research projects already approved in the field of interest to the Dairy Advisory Committee has resulted in recommendations for the program in the fiscal year beginning July 1, 1948. This advisory committee review, typical of the continuing interest which is being maintained by all the commodity advisory committees, expressed general approval of projects already started. Renewed emphasis was given to the importance of disease control among dairy cattle, with special reference to mastitis, Brucellosis, and sterility. The committee also urged that further consideration be given to studies of the effect of governmental regulations on milk marketing, for which no project had been approved up to their mid-November meeting. Improved statistical reports were also suggested as a field for expanded work.

Typical projects which have been approved for work by the various bureaus of the department include the following, continuing the series reported in previous issues:

Poultry, meat and eggs will be studied by the Bureau of Animal Industry to seek reasons for and ways to avoid their deterioration of quality, and especially to find new and improved uses for some of the byproducts in the processing of poultry, meat and eggs.

Cooked poultry meat will be studied by the Western Regional Lab of the Bureau of Chemistry to develop new methods of preparation and processing, with emphasis on turkey meat. It is also hoped that the Western Lab will be able to develop more accurate methods for isolating and culturing microorganisms that might be present in eggs and egg products.

Deciduous fruits will be studied by both Eastern and Western Regional Labs to develop new and wider markets, particularly for those portions of the fruits that are sometimes wasted. Studies will be made on peaches, pears, apricots, plums, cherries, grapes, and berries. Cooperation is planned with the Virginia Agricultural Experiment Station and possibly with other states also.

Potato quality will be studied in a project to be carried out jointly by the Bureaus of Plant Industry and Home Economics. Storage and quality tests will be conducted at Beltsville, Maryland, on the principal commercial varieties of potatoes. A simple method will be sought for pre-determining potato quality for different table uses (baking, boiling, frying, or salad) according to variety, production area, season, storage conditions, etc.

Left-Wingers

TRUE to its left wing tag, the CIO Food, Tobacco, Agricultural and Allied Workers Union has taken a position opposite CIO President Phillip Murray in its attitude toward the Marshall Plan.

In a letter addressed to President Truman, Sens. Pepper and Taylor, the union officers asserted that the plan and Truman's "half-hearted" domestic program will bring neither stability nor peace. Murray favors the plan.

Change Name

THE INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC. is the new name adopted by the erstwhile International Association of Milk Sanitarians, Inc. founded 1911.

Metso Cleaners step up dirt removing, and besides, get rid of dirt for good. Metso's unique action, due to the balanced soluble silica component prevents the redeposition of removed dirt and grease.

A surface cleaned with Metso is grease-free and dry; no greasy feel as left by less efficient cleaners. Metso may be used safely on glass and soft metals as well as on concrete, tile, enamel, wood. Order a 100 lb. trial lot and know Metso's thoroughness in your plant.

PHILADELPHIA QUARTZ CO.
Dept. D, 125 S. Third St., Phila. 6, Pa.

Use Coffee Bean Waste For Milk Cattle Feed

A CORN-SUBSTITUTE cattle feed for milk production has been developed from the waste pulp of the coffee bean, through the cooperative effort of agricultural technicians of the United States and El Salvador, according to a joint announcement by the U. S. Departments of State and Agriculture.

Tests under specific conditions at the agricultural cooperative station Centro Nacional de Agronomia in El Salvador have shown that coffee pulp can be substituted, pound for pound, for corn as cattle feed for milk production. The discovery is considered important to the economy of the coffee-producing countries of the Americas, and internationally noteworthy in view of the world-wide shortage of corn and other feedgrains.

It is estimated that, if all the available coffee pulp of the coffee-producing countries of the Western Hemisphere were converted into feed, it would have a feed value equivalent to 34,000,000 bushels of corn. This is a little more than 1 percent of the average 1943-47 United States corn production.

The process by which coffee pulp is converted into feed is described as relatively simple and economically practicable.

Kansas State Offers Millers' Short Course

A SHORT COURSE for operative millers at Kansas State College, Manhattan, Kans., Feb. 5 to Mar. 6 is being offered for milling and allied industries. Since the course is to be limited to 50 students sponsored by commercial firms, students from foreign countries will probably not be accepted in spite of inquiries already received from Canada and Mexico. The course will be offered again in the near future and students from foreign countries will be put on the waiting list. The milling industry has been asked to assist in drafting rules of eligibility for the first course.

The college also recently revealed that it is to receive a donation of Dr. Charles O. Swanson's library on milling. The Associated Millers of Kansas have raised $1,550 to buy the books as a nucleus of a library to be established honoring Dr. Swanson. Funds coming in later will be used to buy additional books. Dr. Swanson was head of the milling department from 1923 to 1939 and research worker and teacher at Kansas State from 1906 to 1944. Many of the books in Dr. Swanson's library are out of print and are collectors' items. Three books of which Dr. Swanson is author are included.

Australia Converts Quick Freezing Plant

AUSTRALIA'S first war-installed fruit and vegetable quick freezing plant has just been converted to commercial use as the beginning of a new food processing industry there.

The Australian plant was installed for military purposes by Dr. M. A. Joslyn, University of California College of Agriculture food technologist. Word of its conversion to commercial use was brought by S. M. Sykes, Australian government food official. Closing a five-month tour of freezing plants, refrigeration equipment manufacturers, and university food technology departments in the United States and Canada, Sykes conferred with Prof. Joslyn on air blast freezing, processing of fruits and vegetables before freezing, and possibilities for Australian export of frozen foods to nearby Pacific islands.

Overtime Exemptions Listed for Canners

CONDITIONS under which certain canning industry employees may be exempt from the overtime provisions of the Fair Labor Standards Act, for a period up to 14 weeks a year, are listed in a supplementary interpretation of Section 7 (C) of the act, issued last month, by Wm. R. McComb, administrator of the Wage and Hour and Public Contracts Division, Department of Labor.

Emphasizing that the exemption is from the act's overtime provisions only, the administration pointed out that employers may find the exemption applicable to their employees engaged in handling, labeling, and casing of canned fresh fruits and vegetables, even though they perform such activities in a storage place away from cannery buildings. He explained, however, that the work of such employees, to be exempt, must be performed "as a necessary incident to the canning of such commodities by their employer," and that the cannery building itself and the storage place must be parts of the "same place of employment."

McComb said the Wage and Hour Division would consider these three tests for meeting the "same place of employment" provisions of his supplementary interpretation: (1) If the storage place, where the specified operations are performed,

CUSTOM BUILT FOOD

The making of the baby's formula, with all its hazards to the digits of amateur sterilizers, is on its way out in Paterson, N. J. Mr. and Mrs. Roth McClennen provide the formulas as specified by the individual baby's physician. Visitors may watch production operations through the window.

is in the same, or adjoining, county in which the cannery building is located; and (2) if the canned fresh fruits or vegetables were taken directly to the storage place from the cannery building, without intermediate storage elsewhere; and (3) if the specified operations are performed by employees of the canner, who work interchangeably at the cannery and the storage place, or whose activities are directed from the cannery.

Text of the interpretation was published in the Federal Register of November 17.

In addition to the 14-weeks' unlimited overtime exemption the canning industry enjoys a limited overtime exemption up to 14 weeks a year, under another provision of the Wage and Hour Law, because of its seasonal operations.

Quality of Popcorn Discussed at Meeting

QUALITY control, packaging, merchandising, and cooperation between the grower, processor, and equipment manufacturer were discussed at the Third Annual Convention of the National Association of Popcorn Manufacturers, in Chicago, late in November. Although the association was organized only three years ago with 17 members, registration at this third meeting was 450.

Importance of popcorn as a food product is evidenced by the production of 207,000,000 lb. of shelled corn and marketing of 235,000,000 lb. of popped corn products during the past crop year; netting $188,000,000 in sales.

During the discussion on quality control, emphasis was placed on proper handling before popping. To get best popping results it should be conditioned at room temperature after taking out of cold storage. The popper should permit full expansion of the corn and the amount of oil should be at least 25 lb. to 100 lb. of corn. However, 30 lb. of oil to 100 lb. of corn is much better. Use of a special popcorn salt is recommended. Packaging of the product was cited to be an important factor in quality control. The popcorn should be packaged in a moisture-and air-resistant container as quickly as possible after being popped, to avoid exposure to the air for any length of time because it stales easily. Adoption of a container for each type of popcorn product should be preceded by tests on various types of available packages to assure the proper type of packaging. Product inspection and

Better VALVES Better VALVES

LUNKENHEIMER NEW 200 LB. BRONZE UNION BONNET GATE

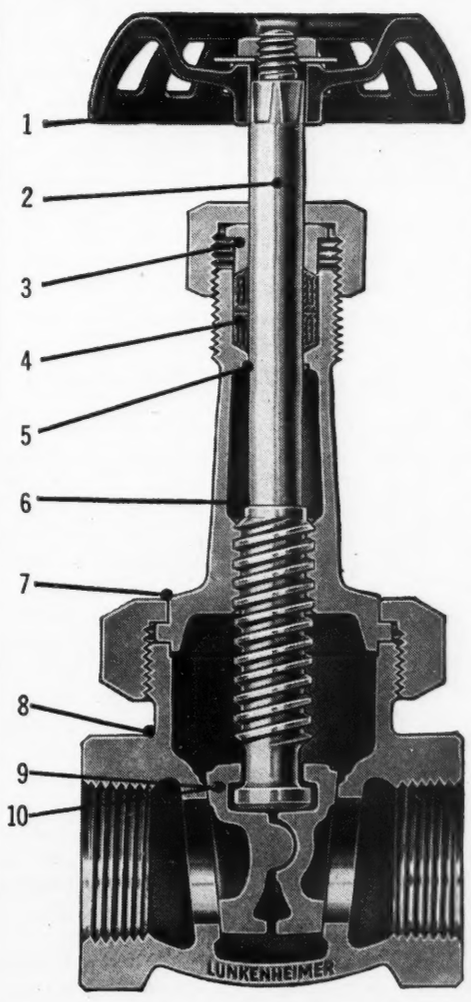


Fig. 2228

SEND FOR DESCRIPTIVE CIRCULAR No. 534

A new high point in low-cost valve service is yours in LUNKENHEIMER's new Figure 2228, 200 lb. Bronze Union Bonnet Gate Valve and companion valves. Combining traditional LUNKENHEIMER superiority in design, materials and workmanship, these valves have every feature you want for better service, longer life and lower overall cost. **The Lunkenheimer Co., Cincinnati 14, Ohio, U.S.A., New York 13, Chicago 6, Boston 10, Philadelphia 34. Export Dept. 318-322 Hudson St., New York 13, N. Y.**

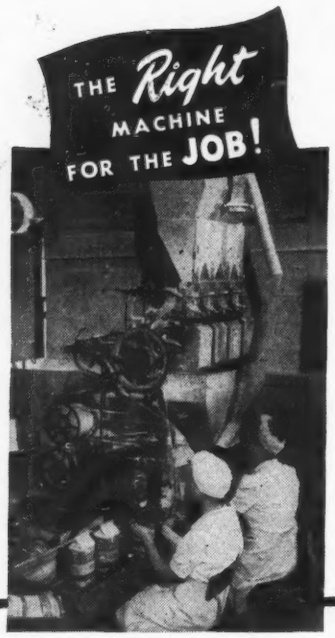
1. Easy-grip, non-heating handwheel.
2. Patented, wear-resistant stem eliminates steam-thread failure.
3. Hex-head gland simplifies repacking.
4. Ample, long-thread stuffing box.
5. & 6. Perfectly machined repacking seats.
7. Valve is easily disassembled.
8. Full-flow body.
9. Self-adjusting double wedge discs.
10. Stay-on-discs make assembly easy.

AS CLOSE AS YOUR PHONE

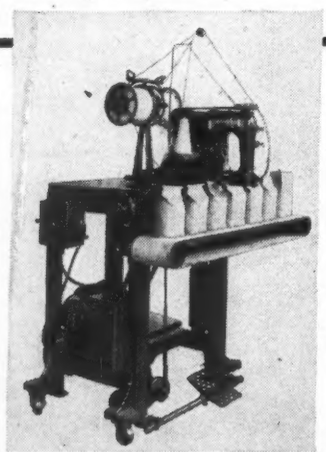
. . . is your Lunkenheimer Distributor, with a stock planned to meet your requirements. His service is maintained for your convenience. Use it whenever you need valves, maintenance parts or advice on valve problems. The friendly assistance you get matches the better service given by LUNKENHEIMER VALVES.

LUNKENHEIMER VALVES

BRONZE, IRON, STEEL, AND CORROSION RESISTANT ALLOY VALVES
AIR DEVICES, LUBRICATORS, AIRCRAFT FITTINGS



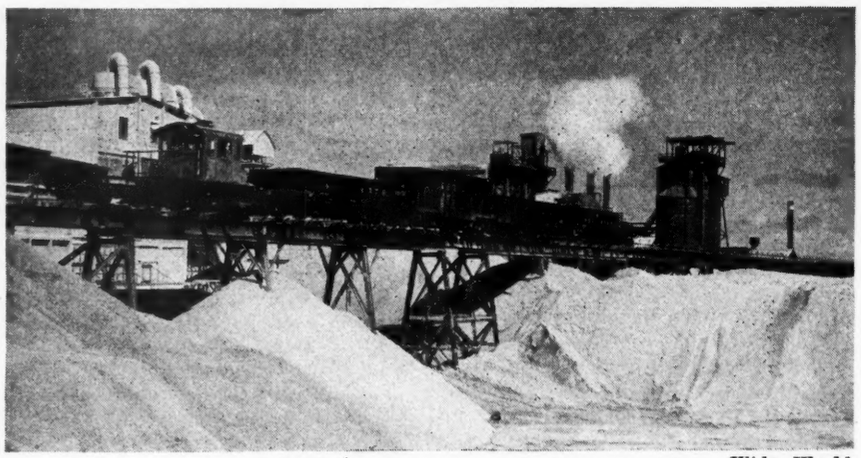
No two jobs are exactly alike—that's why Union Special builds a wide variety of bag closing equipment. It's also the reason why Union Special field representatives make a careful study of requirements before giving you detailed recommendations on the kind of equipment to install. *If it's "Union Special," it's right for the job!* UNION SPECIAL MACHINE COMPANY, 450 North Franklin Street, Chicago 10, Illinois.



Style 21800 N bag closing machine equipped with Style 60000 D sewing head for making Union Special's exclusive Dubl-Tape closure on small paper bags.

Union Special

Bag Closing Machines



Wide World

FLORIDA PHOSPHATE MINING

Florida accounts for 70 percent of the total U. S. output of phosphate. Last year more than 5,000,000 tons of the pebble phosphate were deposited at mills, such as the one shown here, for processing and shipment as fertilizer and feed mix ingredient.

running over ½-in. screen to remove parched kernels are essential to quality maintenance. Finally, recommendation was made that stales be kept off the market by picking them up promptly. Popped corn products are not a satisfactory warehouse commodity.

The following officers were elected: president—Paul H. Rice, T & C Co., Dallas, Tex., vice-president—Charles V. Pike, Dan Dee Pretzel and Potato Chip Co., Cleveland, treasurer—W. T. Hawkins, Confections, Inc., Chicago, secretary—A. J. Villiesse, Chicago.

Resume Salad Dressing Hearings on Standards

ON the second day of the hearing to establish standards of identity for mayonnaise, French dressing, and salad dressing, Food and Drug Administration introduced two doctors who testified as to the importance of label declaration of specific oils used, to aid those who suffer cottonseed allergy. The industry was totally unprepared for such a development and requested recessing the hearing to early January, after the prepared testimony had been adequately made a part of the record. The request was granted and the hearing will resume on January 6, at which time testimony on any part of the proposed standards will be received.

Food and Drug recommendations for minimum percent oil in mayonnaise, French dressing, and salad dressing were 65 percent, 40 percent, and 30 percent respectively. Egg yolk should be added to mayonnaise in an amount equivalent to 5 percent of the finished product as a minimum, according to F.&D.A.

The Mayonnaise and Salad Dressing Manufacturers' Association recommended the same minimum oil content for mayonnaise (65 percent) but differed from Food and Drug recommendations on the other three levels. Twenty-five percent oil was suggested as the appropriate minimum for both French dressing and salad dressing, and no minimum for egg yolk was felt to be desirable. The Association also felt that no label declaration of the specific oils used should be required, opposing the F.&D.A. recommendation that the oils be named.

A number of individual manufacturers felt that higher minimum oil content than the 25 percent suggested by the Association would be desirable. Thirty-five percent was the figure suggested by some.

Ingredient manufacturers were numerous in making an adequate record, as usual.

Corn Canners Survey Reported in 2 States

THE bacteriological survey conducted in 16 corn canneries in Iowa and Nebraska by the National Canners Association during the past summer were recently described by C. W. Bohrer of the N.C.A.'s Washington Research Laboratory staff at the convention of the Iowa-Nebraska Canners Association.

The survey covered 16 canneries in the two corn-growing states, and produced data considered useful in improving the operation of corn canning plants, Mr. Bohrer asserted. The purpose of the survey, he explained, was "to keep spoilage hazards at a minimum by locating the sources of significant bacterial contamination and recommending suitable measures for the prevention and control of such contamination." The corn samples from each

plant were examined in the National Canners Association's new trailer laboratory.

"Each canner who participated in the recent corn survey in Iowa and Nebraska has a report of the findings obtained at his factory or factories, together with any specific recommendations which were considered in point," Mr. Bohrer told the canners.

Grade Standards on Grapefruit, Fruit Jelly

GRADE standards on frozen grapefruit and fruit jelly were about to be issued by the Department of Agriculture as FI went to press last month.

The frozen grapefruit standard as finally published was said to be almost identical with the proposed grade specifications detailed in the Federal Register of October 18.

The fruit jelly standards will not be changed materially from the proposed rules first published in the Federal Register of August 13. Certain quotations from the Food, Drug & Cosmetic Act were removed from the grade standard. Food and Drug Administration felt that inclusion of only parts of the Food & Drug standards of identity might be confusing. Hence, Agriculture deleted these quotes and instead, will refer to the Food & Drug standards, which will be attached in their entirety to the Agriculture grade standards when they are sent out to Agriculture inspectors.

Wide World

NICE ORANGES

Without citrus, a major source of Vitamin C would never have developed. But even worse, there would be no dependable source for "news" pictures such as this. The caption says she is smiling approval of the oranges, but we suspect she knew about the camera.

Why so much "*talk*" about Materials Handling?

In every industry today, materials handling is a very common subject for discussion. Plant engineers realize, probably more clearly than ever before, that the application of well-designed conveying equipment is a great step toward increased production and greater operating economy. There isn't anything new about efficient materials handling. For nearly half a century Mathews Conveyers and Conveyer Systems have been serving production, saving time and creating economy for manufacturers throughout the United States and Canada.

The benefit of this long and varied experience and the facilities of three modern plants is available today to both light and heavy industry. That is why, when talk turns to modern materials handling, that Mathews Conveyer service is frequently brought into the discussion — and it is quite logical that it should be — for this conveyer service is complete from preliminary engineering to erection in the field. Whatever a load weighs — whether a few pounds or many tons — there is Mathews equipment which will handle it efficiently.

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FRICK Refrigeration

Because it keeps the various rooms at the temperatures wanted, with the greatest convenience and dependability.

The Elmer Plant Has 500 Lockers

Witness the new plant of Norman Gaskill at Elmer, N. J., among hundreds of others. This has five rooms, all at different temperatures, and specializes in slaughtering, processing and quick-freezing. Locker renters in a 30-mile circle come to Gaskill's for these services. Four Frick refrigerating machines — two handling ammonia and two Freon-12—carry the cooling load.

Freshly Killed Meat at Gaskill's

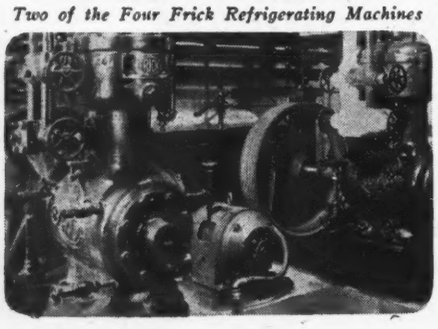
Aging Room, Held at 32–35° F

Well Equipped Processing Dept.

Get the whole story of Frick refrigeration and Frick-Knickerbocker lockers: write

FRICK CO. DEPENDABLE REFRIGERATION SINCE 1882 WAYNESBORO, PENNA. U.S.A.

Two of the Four Frick Refrigerating Machines



DEVELOPMENTS IN DISTRIBUTION

Geneva Tariff Accord Affects Food Products

THE long-awaited details of the reductions in tariffs negotiated by the State Department during six months of conferences at Geneva, Switzerland, reveal a host of tariff cuts ranging up to the 50 percent maximum cut permitted by the reciprocal trade act. The U. S. tariff cuts were offset, at least in part, by reductions in duties made by countries that are markets for the United States' industrial and agricultural products and processed foods.

The agreements, which reduced these tariffs, provide that any country may suspend the reductions in case of unforeseen injury affecting the survival of its domestic industry.

The affects of the foreign concessions are likely to be delayed for months, if not years, since scarcely any foreign country has the dollar exchange with which to finance purchase of U. S. food products. Hence they now conserve their dollars as much as possible through the use of such trade restrictions as quotas, embargoes, exchange control, licenses, etc.

The reductions in U. S. tariffs on food products may result, however, in fairly immediate and substantial increases in imports, especially from Canada, Mexico and Cuba, as well as other countries seeking to build their supplies of dollar exchange by reaching the U. S. market.

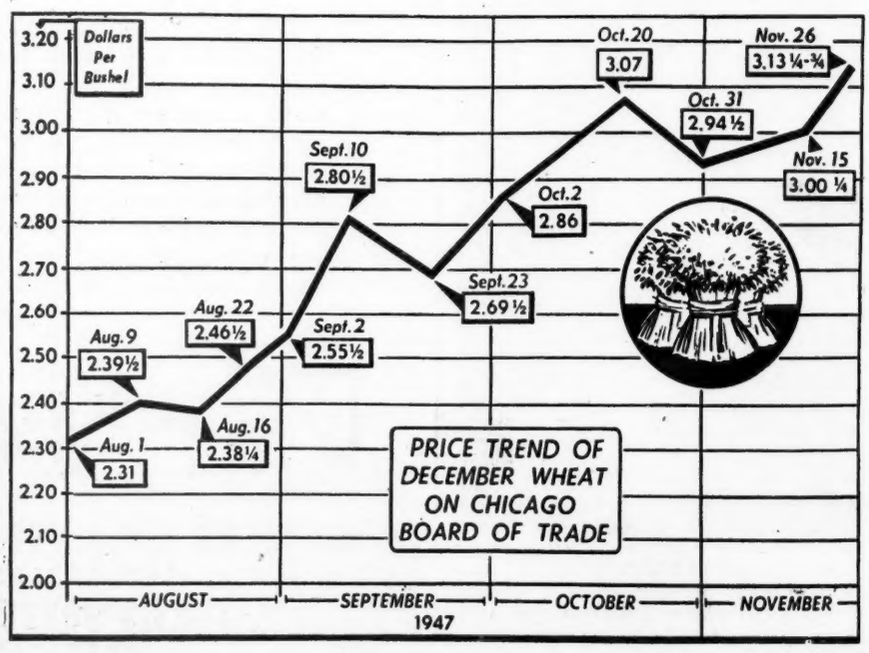
U. S. duty cuts were across the board, on all kinds of commodities and products. The complete list of the new U. S. tariffs on all products is available from the Superintendent of Documents, Washington, D. C., for 50 cents.

The cuts are scheduled to become effective on the date proclaimed by the President. Congressional action is not necessary under the Reciprocal Trade Act, which permits the President on his own order to reduce tariffs by as much as 50 percent. As FOOD INDUSTRIES went to press, it was anticipated that the reductions would be made effective, January 1, on imports from those countries that made their concessions effective that date.

Robinson-Patman Act Cited in Curtiss Case

BUYERS of processed foods who push for prices lower than those accorded their competitors run the risk of violating the Robinson-Patman Act. That's the general significance of a ponderous cease and desist order which the Federal Trade Commission threw at the Curtiss Candy Co., Chicago, recently after six years of litigation.

If it appears to the commission that a price concession induced by the buyer has the effect of "injur-



Press Association

WHEAT PRICE TREND

The government hopes that wheat at $3 per bushel will prove too costly to feed to livestock, even at current meat prices. This chart shows only December wheat.

ing competition," the buyer, as well as the seller, can be prosecuted under the R-P Amendment of the Clayton Act. The Curtiss case is the first one against a buyer that has been fully tried by the commission. Seven other orders have been issued against buyers since the R-P Amendment was passed in 1936, but all these were arrived at via stipulations.

In the Curtiss order, FTC draws a line to show where price discrimination in the sale of 5-cent candy bars begins to cause injury to competition. It made a finding of fact that ½ cent per 24-count package was generally regarded by the trade as sufficient to divert business, while 1 cent would have an unfavorable effect on sales of competing manufacturers. In other words, if a candy company cuts the price of 5-cent bars more than ½ cent to one buyer it would offer a similar reduction in price to its other customers who compete with the first customer. FTC found that Curtiss' prices, including an extensive assortment of promotional deals, discriminated against the majority of its wholesale and retail customers and forced other candy manufacturers either to meet these prices or lose business.

Curtiss attorneys attempted to justify its differences in price on the basis of differences in cost of manufacture, sale or delivery—a defense permitted by Sec. 2 (a) of the Act. FTC found that the company's accounting methods and data were inadequate for this purpose. No cost studies had been made that would justify the differences, the commission said.

Crop Goals for Year Set by Agriculture

THE DEPARTMENT OF AGRICULTURE has announced its crop goals for next year. These preliminary figures reveal that total acreage goals for all crops are up about 3 percent, while goals for livestock, meat, poultry, and dairy products are down somewhat. The goals reflect the department's reaction to the international food shortage with the consequent emphasis on grain for export.

However, the goals announced are not as significant as the two reports due in early spring. The first is the "Final Nation Crop Goals," which represent the department goals as revised after a review by state agriculture officials, who are closer to the growers. The second is the March "Intentions" report, which indicates what the growers

What's alike about these different businesses?

Replacement parts for the aviation industry must be received fast. This business is a big user of Air Express. *Speed pays.*

Everything from fountain pens to serums and medicines flies these days by Air Express. Importers and Exporters, too, find *Speed pays.*

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Air Express helps keep your business in high gear. Because your shipments go on *all* flights of Scheduled Airlines, there's no delay. That, plus door-to-door service—at no extra cost—makes Air Express the fastest possible way to ship. Rates are low: 16 lbs. goes 1400 miles for $6.88—4 lbs. for $2.04. Use it regularly.

- Low rates—special pick-up and delivery in principal U.S. towns and cities at no extra cost.
- Moves on all flights of all Scheduled Airlines.
- Air-rail between 22,000 off-airline offices.
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Just phone your local Air Express Division, Railway Express Agency for fast shipping action.

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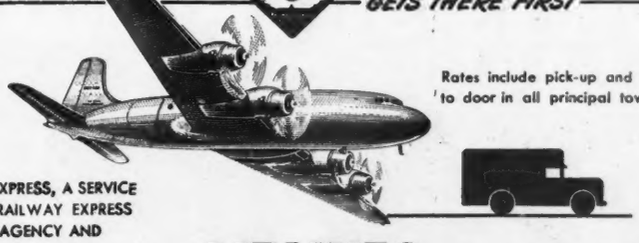

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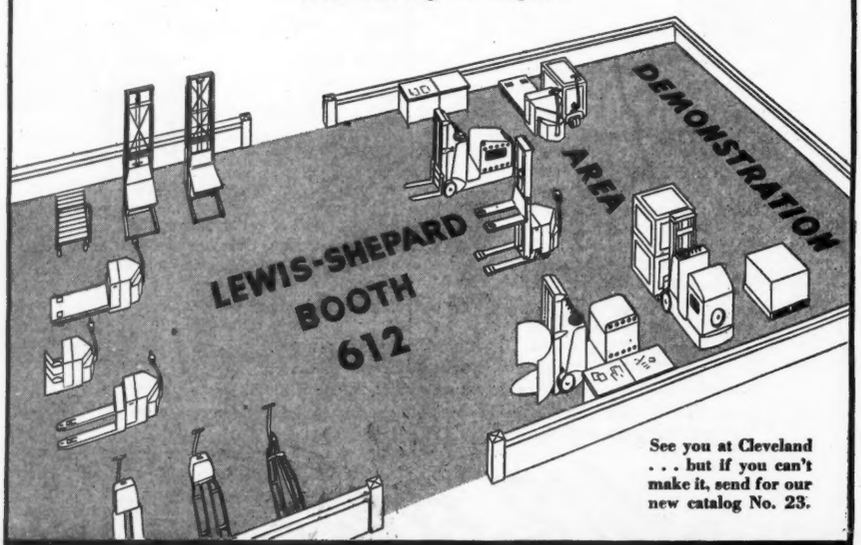

See you at Cleveland . . . but if you can't make it, send for our new catalog No. 23.

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PRODUCTS INC.
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REPRESENTATIVES IN PRINCIPAL CITIES CONSULT YOUR PHONE DIRECTORY

themselves plan to plant for the 1948 crop year. This intentions report is especially indicative of the acreages to be planted—much more so than either of the "goal" figures announced by the USDA.

Standardized Pallet Sizes Approved at NBS

ABOUT three years after the initial conferences were held, the Division of Simplified Practice, of the National Bureau of Standards has approved and issued the "simplified practice recommendation" for pallets for the handling of groceries and packaged merchandise.

The dimensions for pallets finally approved and published by the Superintendent of Documents are 40x 32 in., and 48x40 in. The advisory committee, which approved the recommendation, represented processors and the grocery trade, pallet manufacturers and materials handling equipment, transportation groups, warehousemen, and materials handling consultants.

Adherence to the recommendations of the committee is strictly voluntary; a great many food processors, however, have already written the Bureau of Standards of their intention to use the size pallets recommended.

Meat Grading Rules Undergo Revisions

CLARITY and simplification were the purposes of revising the regulations for grading and certification of meats, prepared meats, and meat products. This function, exercised by the Livestock Branch of the Production and Marketing Administration, Department of Agriculture, has been simplified in two parts.

First change is to limit authority of the Livestock Branch to examine and certify only those meats which are produced at establishments having adequate inspection services. These include federal, state, county, and municipal inspection groups and any others declared suitable by the Administrator. The reason for this change was said to have been to protect the integrity of the grading service. Some misinterpretation of the certificate of this service has been possible in the past when meats were not previously declared to be wholesome and fit for edible purposes.

Second deletion from the old regulations was reference to licensed graders who were not full-time employees with Civil Service status. The meat grading and certification is actually carried out only by full-

More Tender Peas* After the Spiral

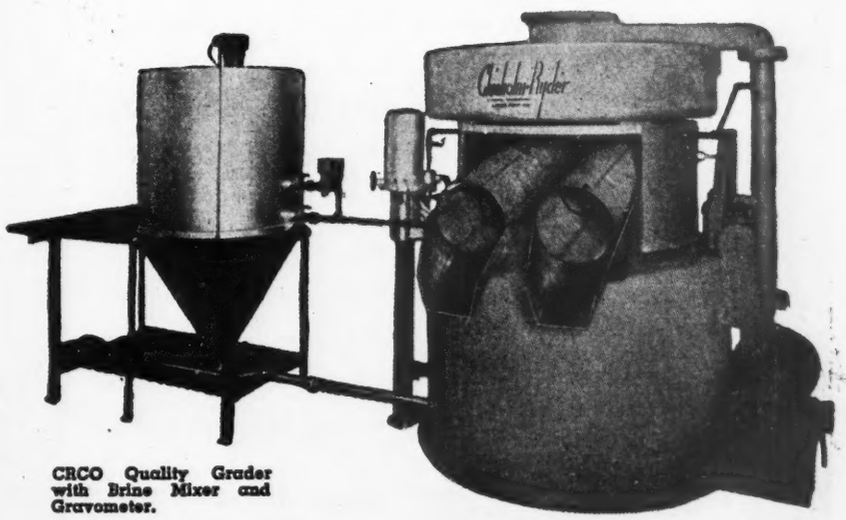
Exclusive Design of CRCO Quality Grader Separates Faster..with Greater Accuracy..and Least Cost Per Ton

Note the patented construction which permits more accurate and speedier grading without absorption of brine. This feature is exclusive with the CRCO Quality Grader.

The patented spiral design employed in the CRCO Quality Grader insures a better, faster separation of peas and lima beans according to their specific gravity—thus securing more of the tender or fancy product from field-runs than any other type of grader. Due to the design of the spiral the brine stream first washes the product of air bubbles so as to insure accurate grading. Then any desired separation can be secured by varying the density of the brine stream—the floaters or better quality from the sinkers or poorer quality. The speed of grading is such that brine absorption is prevented.

In the CRCO Quality Grading Unit, the density of the solution is accurately controlled at any predetermined point without the attention of an operator.

Send for complete details and prices for immediate delivery.



CRCO Quality Grader with Brine Mixer and Gravometer.

***—Equally efficient for Lima Beans and other products which can be graded by specific gravity.**

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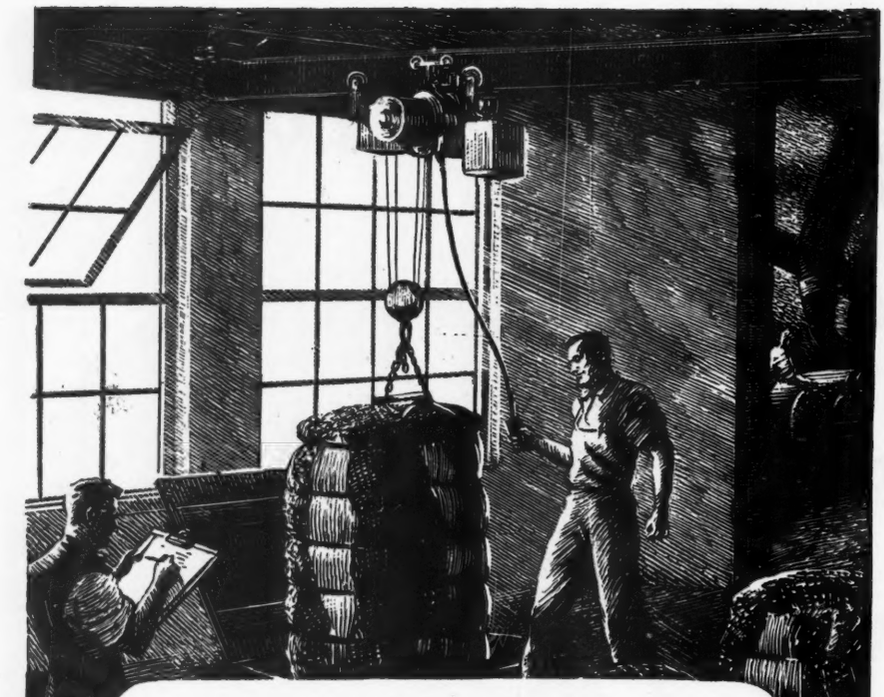

High Costs Under Low Ceilings

When plant ceilings are low, material handling costs may skyrocket, especially if loads are heavy and movements frequent. If yours is a plant where there isn't headroom to install and operate a conventional type electric hoist, there's an answer to the problem — and a Shepard Niles engineer has it.

Show him what you lift and move. He's a trained, experienced man and from the multitude of sizes and types of electric hoists made by America's pioneer builder, he'll recommend the best type of close clearance hoist to do your job economically, smoothly and safely.

Every Shepard Niles hoist has sound design, rugged and precise construction and trouble-free operation built in. The "plus" you get with a Shepard Niles is the right style and installation for your own needs.

★ If your handling problem involves an overhead traveling crane instead of a hoist, Shepard Niles will suggest the right type. There's a Shepard Niles crane for every material-handling operation.

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Press Association

WEEK'S POTATOES

Britain's austerity program does not look too attractive to this North London woman as she contemplates her weekly potato ration held out to her by a vendor.

time employes, in which it differs from certain other grading and certification services.

Other minor changes in the definitions were made for purposes of clarifying the regulations. They have been reprinted in full in the November 20 Federal Register beginning on page 7843.

Co-Op Tax Evidence Compiled at Hearings

DURING 10 days of hearings before the House Ways and Means Committee last month, farmer co-ops and their opponents staged a battle of testimony over the special tax treatment of farmer marketing and purchasing cooperatives.

At issue was the question of (1) whether patronage refunds of these co-ops should continue to be tax exempt and (2) whether special tax exemptions granted under Section 101 of the Federal Tax Code shouldn't be ended.

The National Tax Equality Association led the anti-co-op group; all the major farm organizations supported the present tax treatment of cooperatives.

Both pros and cons referred regularly to a special tax study on cooperatives made by the Treasury Department Tax Research Division which—while not taking sides—raises most of the points made about co-op taxation by co-op opponents, and gives the co-op answers to these questions. The report also contains some of the most reliable statistical information now available on the size of the cooperative movement, together with the Treasury's official estimates on its losses

You may find the answer by gazing into space

IT might pay you—as it has many others—to look into high vacuum.

It was high vacuum distillation that brought forth the precious concentrates for Vitamins A and E. High vacuum dehydration aids in the production of penicillin. High vacuum played a part in atomic developments. With high vacuum distillation, former waste materials from a soap manufacturer are converted into valuable pharmaceuticals. For a perfume manufacturer—thousands of dollars' worth of essential oils are recovered from residual sludge.

Who can say what may be born in a vacuum? High vacuum adapted to the fractionating of petroleum, to the processing of foods, chemicals, textiles, metals, plastics, electronic equipment, may be worth millions of dollars to these industries — discover invaluable benefits to humanity, in better health, better living.

Why not learn if high vacuum techniques can work for you in your business? The first step is to send for booklets. Then you can judge if it is advantageous to investigate further by requesting the services of DPI's Experimental Department.

To Aid Research Staffs of Industry

DPI has designed small-sized, but complete, laboratory high vacuum stills. They are offered at nominal cost with the express purpose of encouraging research for broader commercial application of molecular distillation. Write for information.

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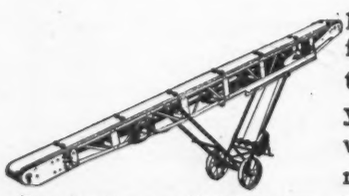
Farquhar Conveyor Model 435-FM with hydraulic lift for fast and accurate freight handling.



Farquhar Conveyor Model 431-EW for heavy-duty handling of bags, boxes, cartons.

FARQUHAR FREIGHT CONVEYORS are designed with one purpose in mind—*to cut handling costs,* no matter what the handling problem may be. Farquhar conveyors are flexible, can be set up quickly, singly or in tandem, to move packaged materials fast, economically, continuously . . . because they're built to "take it." For horizontal conveying, for loading, unloading, stacking, piling or moving bags, bales, boxes, cartons from floor to floor . . . see Farquhar first for the right materials handling conveyor for your job. Tell us your handling problem; we'll see that you get the information you need. Write A. B. Farquhar Company, 205 Duke Street, York, Pennsylvania, or 628 Elm Street, Chicago 10, Illinois.

HYDRAULIC PRESSES
FARM EQUIPMENT
FOOD PROCESSING AND
SPECIAL MACHINERY

Farquhar PORTABLE OR PERMANENT MATERIALS HANDLING CONVEYORS

of tax revenue under the present law which favors co-ops.

In general, the co-ops feel that their opponents made little headway during the course of the hearings. For one thing, they feel sure that the political situation — the vying for the farm vote during the upcoming presidential election — will make it well-nigh impossible for the Republicans to force through legislation unfavorable to the farmers' co-ops. This is especially true since (1) the Democrats on the House Committee are almost 100 percent against changing the co-op, and there are Republicans who will vote with them and (2) the Democrats as a party have attacked Republicans for their "anti-co-op" hearings.

Many farm leaders have privately expressed the opinion that they will "go along" with an amendment to the law removing them from special exemption from the Federal Corporate income tax — but they don't feel they will have to. Most observers agree that Congress won't give any serious consideration to taxing patronage funds.

Cuts in Supplies Loom For Food Can Users

FOOD processors, who can pack in containers other than tin cans, will find their supplies of cans reduced, and perhaps eventually cut off under tin control powers still held by the Office of Materials Distribution, Department of Commerce.

The agency has been making studies for the past couple months with a view to the procedures by which they can conserve more tin

Press Association

NO FISHEATER

The rest of the country may take "meatless Tuesday" with a shrug, but this gent had never heard of Charles Luckman and wants no part of the product of one of the nation's most important food industries.

a THATCHER creation
Thatcher designers and engineers co-operated in creating this special private-mold, wide-mouth container to meet the particular packaging requirements of Beechnut. Whatever your glass packaging problems, it will pay you to use the expert services at Thatcher . . . available at your request.
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PEANUT BUTTER
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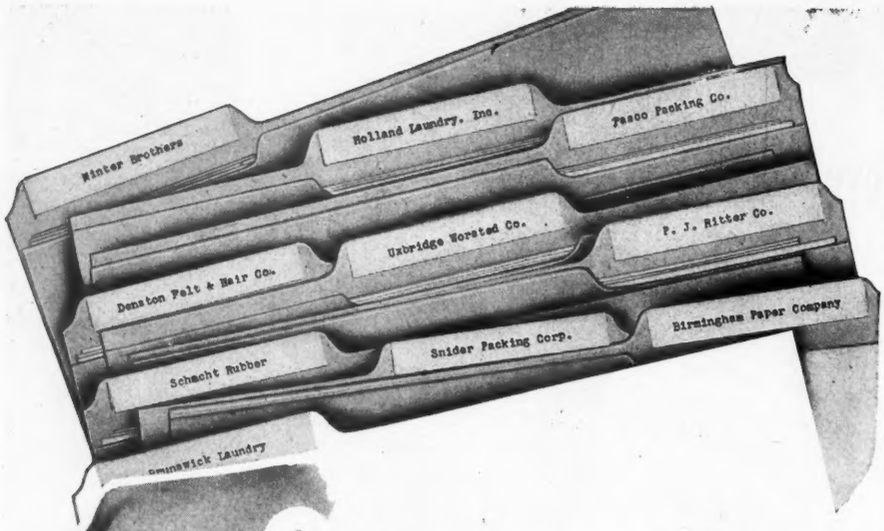

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come hundreds of stories of **fuel saved • steam saved production speeded • quality improved**

IN the brief space of an advertisement it is difficult to impart the truly surprising results attained by firms like your own (if you use steam for processing) who have replaced ordinary methods of condensate return with the Cochrane C-B System. The detailed stories from our files, however, carry a conviction that our own unsupported claims, however logical, could never attain.

Write for a copy of Publication 3250 and specific stories about your own particular industry.

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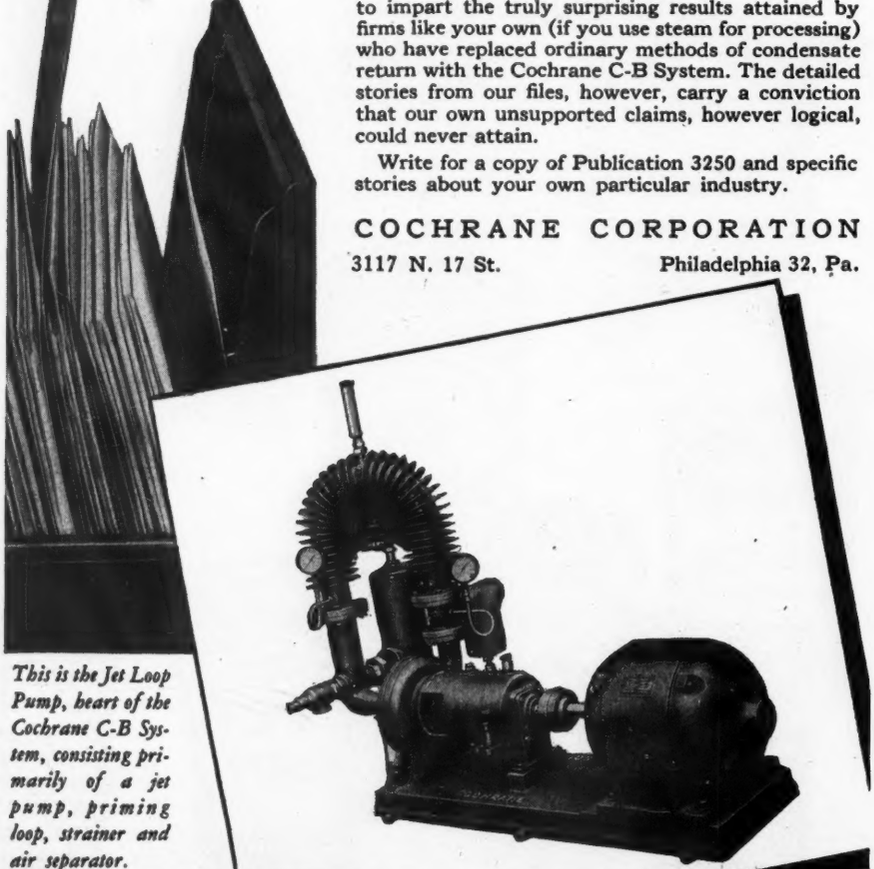
3117 N. 17 St. Philadelphia 32, Pa.



This is the Jet Loop Pump, heart of the Cochrane C-B System, consisting primarily of a jet pump, priming loop, strainer and air separator.

COCHRANE CONDENSATE C-B BOOSTER SYSTEM
OF HIGH PRESSURE, HIGH TEMPERATURE CONDENSATE RETURN

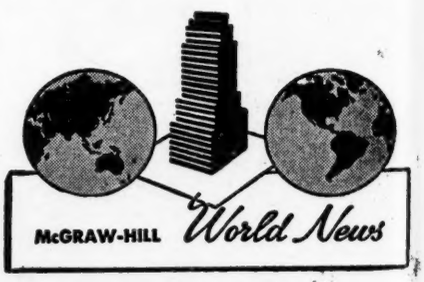
by switching from tin all products that can be packaged in other materials. The reason: Can consumption and tin consumption has been larger than the influx of tin supplies. Beer, for instance, has been going to market in cans at a swiftly increasing rate over the past few months. The same is true for coffee.

In conferences with representatives of the beer and coffee industry, government officials have received assurances that the groups would cooperate in a conservation campaign. The petroleum industry is also involved.

The need to conserve tin stems from the low level of stocks in this country. Last summer, for instance, tin stocks in the U. S. were about 45,000 tons, the lowest since 1940.

Egg Packing Tip

SUCCESSFUL packing of eggs depends to a large extent on giving them a chance to breathe, says Harold W. Poulsen, chief of the bureau of fruit and vegetable standardization, California state department of agriculture. Eggs breathe through the air cell which is formed as the egg cools. This air cell is nearly always at the large end of the egg. If the egg is packed with its big or air cell end down, the weight of the egg meat is against the air cell and the egg literally smothers. Eggs so packed will lose quality two to three times as fast as those packed with the small end down.



Russia Is Replacing Canned Milk Plants

MOSCOW—Having risen out of war ruins, the Soviet milk canning industry now boasts eleven large mechanized condensed milk plants, as many as before the war.

Four out of the six milk canning plants that were destroyed by the Germans are now functioning in Stalingrad, Velikiye Luki and in the Byelorussian Republic. Two plants set up during the war in Kazakhstan and the Krasnoyarsk Territory in Siberia are working full blast producing annually 11 million cans of condensed milk and 800 tons of powdered milk.

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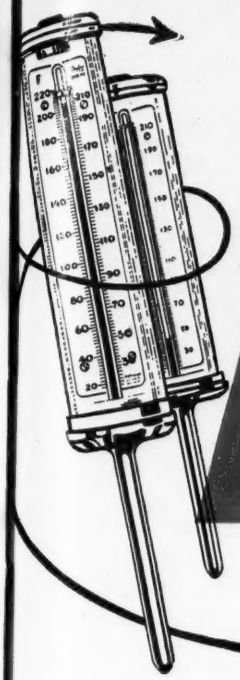
At Any Temperature



he Vacuum applied in the Jensen A & G Pasteur- eliminates *all* air, gas, and undesirable odors heating, holding, mixing or cooling. Regardless erating temperatures, the vacuum acts to produce products of superior quality which taste better, longer, and retain all their richness.

he use of vacuum when batch pasteurizing tively removes air and gas without any ge to the product.

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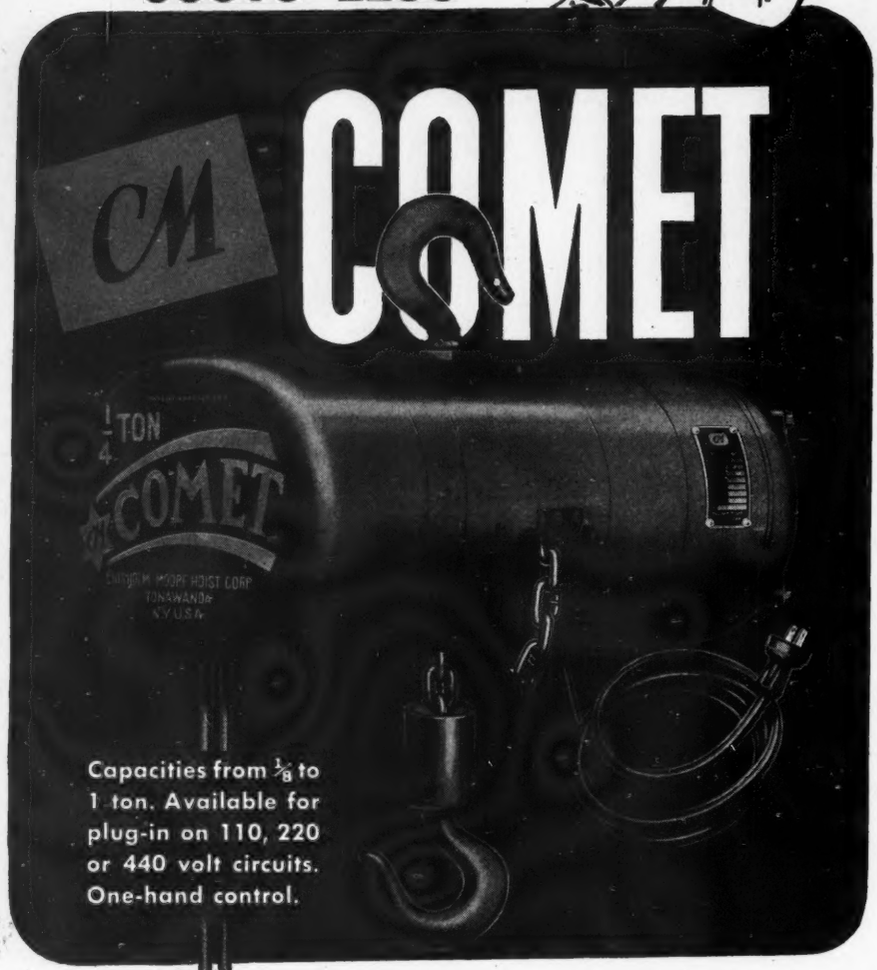
Specialists in INDIVIDUALLY ENGINEERED FOOD EQUIPME

VACUUM BATCH TREATED PRODUCTS *Taste Better-Last Longer*

Electric Hoist-Power COSTS LESS

CM COMET



Capacities from 1/8 to 1 ton. Available for plug-in on 110, 220 or 440 volt circuits. One-hand control.

- ECONOMICAL
- PORTABLE
- SPEEDY
- STURDY

Manual handling of materials is inefficient . . , more so today than ever before. The CM Comet makes substantial savings in materials handling costs . . . is doing it every day in thousands of plants. Possibly the CM Comet can save a good many dollars for you too. Check up on the materials handling situation in your plant. CM Bulletin 138 . . . available for the asking . . . will bring you complete details about the Comet.

CHISHOLM-MOORE HOIST CORPORATION

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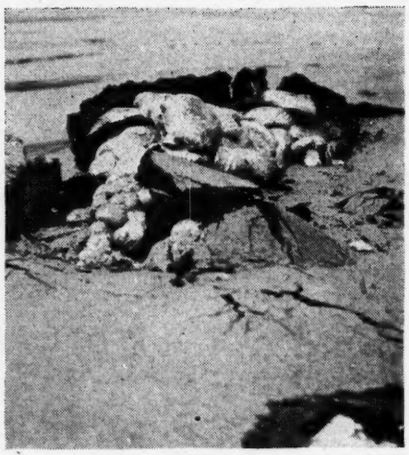


Keystone

STRONG MUSHROOMS

The seed got under this Stockholm asphalt somehow, and then the hot sun gave them the urge to grow. So here they are.

One of the youngest Soviet industries, milk canning (established in 1935), faces a bright future here, with output scheduled to rise two and a half times by 1950 as compared with pre-war canned milk production.

The next three years will witness the construction of 13 new milk canning plants, while reconstruction of the demolished plants will be completed in 1948.

Banana Drying

MELBOURNE — A banana-dehydrating plant has been started at Suva, Fiji Islands, and has immediately found outlets in remote markets. The bananas are dehydrated whole instead of being split as in the Samoan banana-drying process. They are shipped in colored Cellophane wrappers with distinctive Fijian labels.

It is said that a banana cannery was operating at Suva 60 years ago, and there was a small but prosperous dried-banana industry at Levuka 30 years ago.

Maize for Macaroni

MILAN, Italy—In view of the difficulties of importing wheat from foreign countries and the shortage of the Italian wheat crop, the Pastificio Agenesi, at Imperia, has developed a new process to exploit maize as raw material for the output of macaroni. Italian industries are now urging the Italian government to forbid import of macaroni made with wheat from foreign countries.

The Italian engineering industry is developing a new type of macaroni producing plant, featuring mechanical milling of maize, manufacturing of the macaroni, drying

Bonus* Built

THE AMAZING RESULT OF AN ENGINEERING PRINCIPLE THAT ASSURES LONGER TRUCK LIFE

... And ONLY Ford Trucks Have It!

Coming for 1948—a brand new line of Ford Trucks . . . new all through . . . and Bonus Built, too!

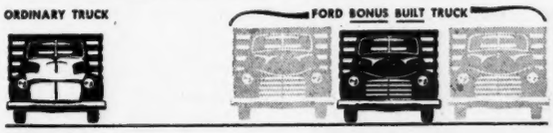
Soon you'll see the great new line of Ford Trucks—great not only because they are *new all through*, but because they are the amazing result of a time-proved truck building principle.

This principle is Ford Bonus Built construction. Here's what it means to you:

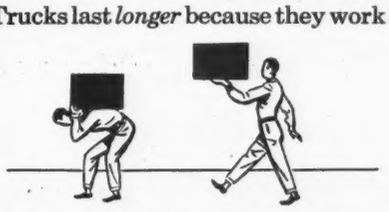
Every one of the new Ford Trucks for '48 is built with *extra strength* in every vital part. This extra strength provides WORK RESERVES that pay off in two important ways:

First, these Bonus Built WORK RESERVES give Ford Trucks a greater *range of use* by permitting them to handle loads beyond the normal call of duty. Ford Trucks are not limited to doing one single, specific job!

Second, these same WORK RESERVES allow Ford Trucks to relax on the job . . . to do their jobs with less strain and less wear. Thus, Ford Trucks last *longer* because they work *easier!*



Not ONE Capacity . . . but real RANGE when needed!



The load is carried EASIER by the stronger man!

Remember, every Ford Truck for '48 is Bonus Built for longer life, wider use. Keep in touch with your Ford Dealer . . . plan to see these new Ford Bonus Built Trucks for '48 as soon as announced. Don't settle for less—get the only truck that's Bonus Built! It's Ford!

***BONUS:** *"Something given in addition to what is usual or strictly due."—Webster's Dictionary.*

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LIFE INSURANCE EXPERTS PROVE . . . FORD TRUCKS LAST UP TO 19.6% LONGER!

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By processing coal from our own mines through our own chemical plants, we make available to our customers a steady, dependable supply of highest quality Sodium Benzoate at all times.

Fine-flaked Tepco Sodium Benzoate gives uniformly better solubility.

Prompt service to any part of the United States.

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General Office: Nashville, Tenn.

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and packing. Orders for the new type machinery have come also from foreign countries.

Soviet Cheese Plant Exceeds Output Quota

Moscow—The Soviet Union's largest mechanized plant for making processed cheese, recently opened in Moscow, has put out its first 2,200,000 lb. of cheese products, surpassing its schedule by 30 percent.

Consisting of four sections, the plant is equipped to produce diverse kinds of cheese including the well-known Swiss, Dutch, Soviet and Bachstein cheeses, and special sorts with tomato, garlic and pepper.

New kinds of cheese being produced at this plant are a chocolate processed cheese and sweetened varieties of cheese flavored with natural orange and tangerine juices. A method has been developed for processing "brynza," a kind of cheese made from goat's milk.

SCHEDULE OF EVENTS

January

7- 9—Northwest Canners Association, annual meeting, Multnomah Hotel, Portland, Ore.
11-13—National Preservers Association, annual meeting, Stevens Hotel, Chicago.
12-16—Second National Materials Handling Exposition and Conference, Public Auditorium, Cleveland.
13-16—National Food Brokers Assoc., annual meeting, Atlantic City, N. J.
16-17—National Pickle Packers Association, winter meeting, Hotel New Yorker, New York.
17-23—Canning Machinery and Supplies Association, annual exposition, Public Auditorium, Atlantic City, N. J.
18-21—Food Industry Exposition, Steel Pier, Atlantic City, N. J.
18-23—National Canners Association, 41st annual convention, Auditorium, Atlantic City, N. J.
19—National-American Wholesale Grocers, annual convention, Atlantic City, N. J.
19-31—Pennsylvania State College, Ice Cream Short Course, for plant personnel, State College, Pa.
22-23—National Dairy Council, annual winter conference, Hotel Schroeder, Milwaukee, Wis.
26-29—Refrigeration Equipment Manufacturers Association, 5th All-Industry Exposition, Public Auditorium, Cleveland, Ohio.

February

1- 3—Institute of American Poultry Industries, fact finding conference, Kansas City, Mo.
2- 6—American Society of Heating and Ventilating Engineers, 8th International Exposition, Grand Central Palace, New York.
7- 8—Refrigeration Research Foundation, annual meeting, Haddon Hall, Atlantic City, N. J.
9-12—National Association of Refrigerated Warehouses and American Warehousemen's Association, Haddon Hall, Atlantic City, N. J.
12-13—Michigan State College, annual canners' and fieldmen's conference, School of Agriculture, East Lansing, Mich.
15-19—American Institute of Chemical Engineers, regional meeting, Roosevelt Hotel, New Orleans, La.

March

15-18—National Association of Frozen Food Packers, 2nd annual convention, Hotel Stevens, Chicago.

Changes in Food Supplies

(Indicators)

Materials

Green lima beans for processing are estimated at 47,200 tons, 6 percent above 1946 production and 60 percent over the 1936-45 average of 29,490 tons.

Pimientos harvested for processing in Georgia and California are estimated at 19,140 tons. This is 17 percent less than last year's production, but is 17 percent more than the recent ten-year average.

The cocoa bean crop for 1947-48, estimated at 644,450 tons, is nearly 50,000 tons below prewar exportable supplies, according to the International Emergency Food Council.

Soybean supplies are the smallest in six years as a result of the 10 percent drop in the 1947 crop and smaller than average carryover stocks. This decline obtains despite the record crushing operations last year, and reflects the heavy use of soybeans for oil and feed.

Production

Creamery butter production was estimated at 91,820,000 lb. for October, or 9 percent less than the September output. The seasonal decline at the same time last year was only 6 percent, but the average downturn between September and October in the 5-year (1941-45) period was 11 percent.

American cheese production was figured at 64,675,000 lbs. for October, 13 percent below the September estimate. This compares favorably with the 12 percent decline last year and the 14 percent decrease between September and October for the 5-year period.

Green peas packed in 1947 came to a total of 33,119,000 cases, on a 24/2's basis, in the estimates of the National Canners Association. This was about 15 percent less than the previous year's all-time record pack of 40,933,000 cases. Despite this decrease, however, the carryover is slightly larger than at this time last year.

Flour production, in September, estimated at 24,800,000 sacks, was 4 percent below the August output, but 5 percent greater than September, 1946 output of 23,700,000 sacks.

Fats and oils production from domestic materials reached an unexpected high of 9,624,000,000 lb. for the 1946-47 crop year. This was close to the 1941-42 output, which was the third highest in history.

Oleomargarine output for the first half of 1947 reached 430,401,000 lbs., up 22 percent from the 352,462,000 lb. turned out the first half of 1946.

Shortening production dropped 11 percent in the first half of 1947, the output totaling 820,390,000 lb., compared with 923,928,000 lb. produced in the same 1946 period.

Stocks and Storage

Frozen fish and shellfish held in storage November 1 came to 140,069,000 lb., an increase over the 136,074,470 lb. held a month earlier, but a decline from the 149,549,332 lb. held Nov. 1, 1946.

Public cooler occupancy rose 7 percent during October, being 80 percent filled on November 1. This was a record increase and put occupancy at 5 percent above average and equalled the previous November 1 occupancies of 1944 and 1946.

Freezer occupancy rose from 81 to 83 percent during October, which was 2 points below average and 4 points below the Nov. 1, 1946 holding.

Indexes

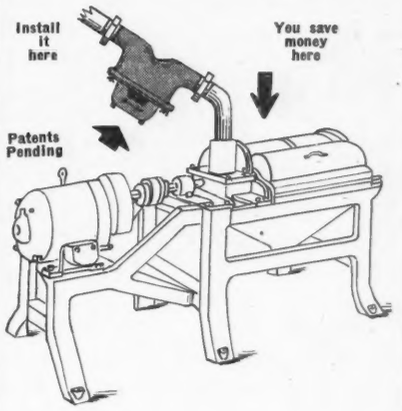
The commodity price index on food, compiled by the New York Journal of Commerce, was 207.2 for the week ending December 6. This compares with 206.3 for the preceding week, 204.1 a month ago, and 184.9 for December, 1946.

Business Week's index of business activity stood at 191.2 for the week ending November 29, compared with 190.9 for the preceding week, 186.4 the month before, and 178.5 a year ago.

CONSTRUCTION NEWS

	Pending (thousands)	Awarded—Dec., (thousands)	Total Awarded—1947 (thousands)
Bakery	$ 900	$	$ 16,907
Beverages	1,105	259	35,740
Canning and Preserving	55	....	534
Cold Storage	150	200	4,637
Confectionery	....	....	1,364
Grain Mill Products	5,810	270	30,147
Ice, Manufactured	....	120	566
Meats and Meat Products	480	134	6,568
Milk Products	190	60	8,641
Miscellaneous	1,105	115	18,170
	$9,795	$1,158	$123,274

Protect Your Screens and Product



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Tramp metal formerly ruined five screens a season. After "CESCO" was installed, the same screen carried all the way through. And the danger of metal particles in the finished product was eliminated at the same time.

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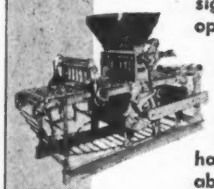
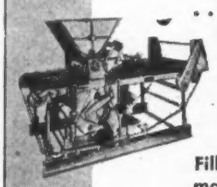
"WE'VE PACKED THEM IN FOR YEARS"

It is a matter of record that the "GEYER" Filling Machines have "packed them in" by solving packaging problems for the food industry over a period of thirty-three years.



Custom built, compact Filling Machines that handle semi-liquids to semi-solids and designed from a cost and operating standpoint to be adaptable for large or small production quotas — there is your assurance of a Filler that has earned an enviable record for performance in packaging.



Fillers are straight line with multiple cylinders . . designed for **CLEAN CUT OFF FILLING** for products that seek their own level . . **BOTTOM UP FILLING** for semi-solids . . No drip . . Clean Filling . . Entirely automatic . . Readily adjustable to any size or shape container . . Maximum production output.

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SYRUP	MAYONNAISE
JELLIES	PEANUT BUTTER
CHEESE	APPLE BUTTER
GLUE	VANISHING CREAM
PASTE	MUSTARD AND
GREASE	SIMILAR PRODUCTS

THE FILLER MACHINE CO. INC.
1248 E. MONTGOMERY AVE., PHILA., PA.

What Washington Thinks

By R. S. McBRIDE, Washington, D. C.

ACIDITY SCALE—Control of acidity or alkalinity of foods and of food-processing solutions is an important part of technical management of the food factory. For this application, as for the rest of industry, National Bureau of Standards is recommending the general adoption of a single standard scale, like the international temperature scale. To assist in applying the proposed national standards of definition of pH, the Bureau is now prepared to offer samples which can be used in determining fixed points of reference as a guide to plant laboratory work. The proposed standard materials of the Bureau deserve much wider acceptance and use than they have yet achieved.

PRICE POLITICS—The control of social relationships is a necessary and proper job for politicians. Indeed, the politician is merely the engineer of the social sciences, trying to make things serve the public practically which the theoretical man says ought to work. But there will be more than that in the political consideration of price control and the cost of living. At the beginning of the special session, the food industries entered an era of bitter partisan recrimination and name calling in which both Democrats and Republicans seek political capital, often without any consideration for the well-being of the food business. Any food executive that can minimize this will be doing a very great service to all food-handling enterprise.

REDUCED LOSS — A new research project of the Department of Agriculture is planned for "new and improved packaging to reduce losses and increase the efficiency of the marketing and distribution of rice and dry edible beans and peas." This is an excellent reminder for all food technologists that good packaging always tends to reduce losses and increase efficiency of distribution. Perhaps a conscious re-viewing of all the packaging problems of his enterprise will be a profitable matter for each food executive and technologist.

"INTERRUPTABLE" GAS — Large users of natural gas for food factory purposes should inquire into the basis on which their supply is handled. Particularly they should determine now whether somewhere along the line there is any interruptable contract arrangement. There are not sufficient transmission capacities to bring gas to meet total needs expected this winter. Many supply contracts provide that certain parts of distributor and customer needs may be interrupted to insure supply for other customers of higher priority rating. Factories so affected may expect interruptions of fuel gas deliveries this winter. Pre-arrangement for such contingencies is vital, if large losses are not to be incurred.

COMPLIANCE FIRST—National Labor Relations Board is definitely refusing labor controversies originating with or affecting unions which do not comply with the affidavit section of the law. Until non-Communist affidavits are received and the union is fully registered, it can not do business with N.L.R.B.

CONTROL BY LICENSE—Much international trade is no longer mildly influenced by governmental rulings here and abroad, such as those involved in tariffs and other import and export fees. Now actual control by license is the common situation. One of the recent ones is the Swedish requirement that apples for Christmas trade must get a license for entry into that country.

INERT ATMOSPHERE—Mayonnaise and other salad dressings made in an inert atmosphere were described to Food and Drug Administration as a part of the standards hearings on these commodities. Use of nitrogen

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in this way is intended to eliminate oxygen from the product. The purpose is to lengthen the shelf life and increase palatability for the customer, results expected because oxygen from the air in these products tends to accelerate development of off-flavor.

ELIGIBLE MEAT—Protecting public health and protecting against entry of hazardous pests are two jobs of the U. S. Department of Agriculture. Both tasks are furthered in the meat inspection service by proposed changes in the import regulations applicable to meat. Bureau of Animal Industry, the inspection agency, desires that the only meat eligible for entry into the United States be that prepared in establishments where the foreign meat inspection is equivalent in the standards and thoroughness to that of our own government.

SURPLUS SUGAR—When the price controls were taken off sugar, there was no rise in prices. Industry spokesmen are arguing in Washington that this proves one basic economic fact. When there is plenty of material to supply consumer wants, there is no great likelihood of price rises. In making this argument, Chamber of Commerce of the United States says that "sugar is one of the few major food commodities of which the supply has been brought into substantial balance with demand." Indeed their argument implies that a sugar surplus is just over the economic horizon.

SCHOOL LUNCHES—Marketers of any foods, which make good lunch raw material, should look at the data that guide the national School Lunch Program. Millions of youngsters are served daily one hot meal largely at the expense of the federal taxpayer. The "quantities of food to purchase" and "size of servings" are significant in estimating the magnitude of this new market. The Bureau of Human Nutrition and Home Economics has tabulated information on this subject as a national guide to lunch-serving units throughout the country. It is an illuminating indication of the importance of a new group of food purchasers.

BUSINESSLIKE—Suppliers of soy and cottonseed oils are invited by the Department of Agriculture to submit offerings of these needed commodities with assurance of prompt action. When the government decides that it wishes to purchase at prices indicated, acceptance will be given by telegram within three hours of the receipt of offerings. This exceptionally rapid action for a government agency is intended to enable an oil owner or dealer to do business with the government in competition with fast-moving trade. Officials hope that it will aid in getting wanted offerings at an acceptable price.

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Industrial Division

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INDUSTRY

American Institute of Baking, Chicago, has been granted $8,000 by the Laminated Bakery Package Research Council to study the packaging of bakery products. Aim of the study is to determine the most effective means of packaging all types of bakery products and to evaluate available types of packaging materials.

American Meat Institute, Can Manufacturers Institute and the National Meat Canners Association have announced the undertaking of a 1948 joint canned meat promotion program. The program was announced by Ralph Keller of Geo. A. Hormel & Co., speaking for the meat canners.

Dairy Employees, Drivers and Maintenance Union, AFL local 16 of Amite, Ala., plans a milk processing plant to cost approximately $1,000,000.

D ughnut Corp. of America soon will be operating its new plant at Noblesville, Ind., according to A. Milton Rubottom, manager of the Noblesville branch.

Gaines Division of General Foods Corp. has opened its new dog food plant at Kankakee, Ill. The plant replaces manufacturing operations at Sherburne, N. Y., and Chicago Heights, Ill. The Kankakee unit is under the general managership of J. J. Mullen, who has been operating the Corn Mill Division of General Foods.

General Mills, Inc., Minneapolis, has announced the election of Harry A. Bullis as chairman of the board, succeeding James F. Bell. Mr. Bell will continue with the company as chairman of a new committee on finance and technological progress. Leslie N. Perrin, former executive vice-president, moves up to the presidency, that post having been vacated by Mr. Bullis.

North American Canning Co., Dania, Fla., was completely destroyed by fire recently, a loss estimated at $500,000. The building contained canned vegetables worth $200,000, much of which was canned under government contract. Also destroyed were 10 carloads of beans which had arrived from North Carolina.

Peter Paul, Inc., has purchased the 33,000 sq. ft. manufacturing plant in Dallas, Texas, formerly occupied by Hollywood Manufacturing Company. Reported price was just under $200,000. The firm will begin operations there early this year.

JAMES S. ADAMS

JOEL S. MITCHELL

Formerly president of Standard Brands Inc., New York, James S. Adams recently was elected chairman of the company's board of directors. Mr. Joel S. Mitchell, executive vice-president, moves up to the presidency.

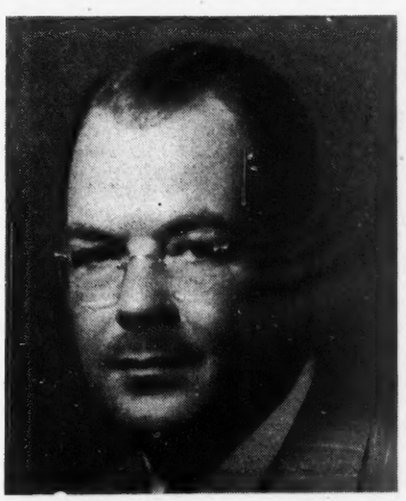
Quartermaster Food and Container Institute, Chicago, has added 13 scientists, food and container technologists and other professional personnel to its staff.

Red Star Yeast & Products Co., Milwaukee, has announced the appointment of Hugh L. King to the position of general sales manager. In his new capacity, Mr. King will have supervision over all sales activities of the yeast division.

Russell-Miller Milling Co. plans to build a new mill at Alton, Ill., to replace the one destroyed by fire in 1946. Cost is estimated at $1,000,000. The elevator capacity of the mill will be 1,500,000. bu.

Southern Research Institute has added Robert L. Van Asselt, Walter Wade Robinson, Robert N. Roberts and Mitchell Kegley to its staff.

Stokely-Van Camp, Inc., Indianapolis, Ind., has purchased the Berlin and Appleton, Wis., plants of the Fuhremann Canning Co., it was recently announced by Herbert F. Krimendahl, executive vice-president of the Stokely company. The plants are equipped for canning beets, corn, peas and carrots.

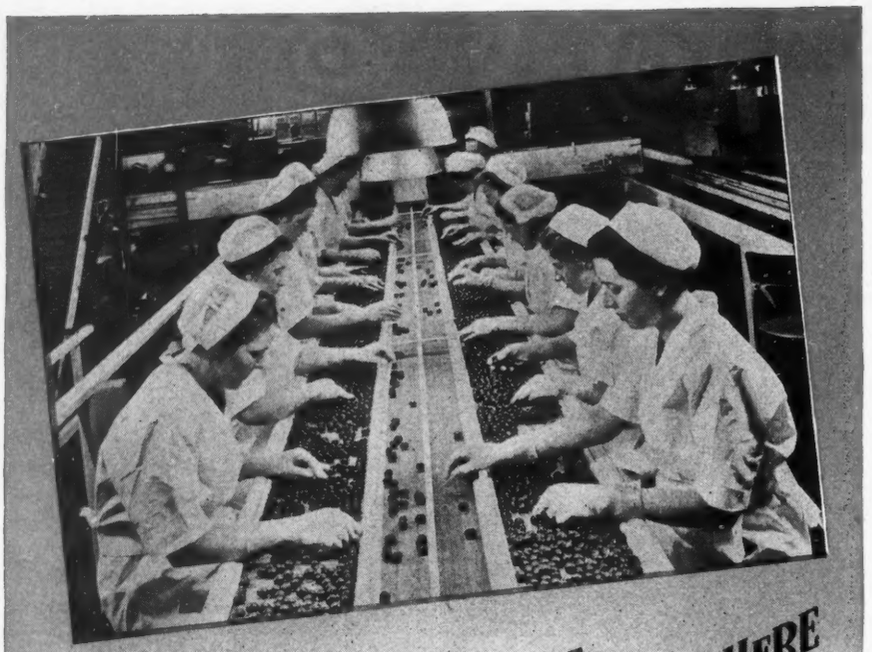


HARRY K. SCHAUFFLER

The National Frozen Food Council has announced the election of Harry K. Schauffler as executive director of the council. He will direct a survey to increase public knowledge of food preservation by freezing.

PROF. MELVILLE L. WOLFROM

A professor at Ohio State University, Melville L. Wolfrom has been elected chairman of the Division of Sugar Chemistry and Technology of the American Chemical Society.



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Swift & Company will erect a 500,000 bushel soybean storage elevator at its Champaign, Ill., plant, as a feature of the company's $788,800 expansion program at Champaign. The new bins will increase the storage capacity to 1,500,000 bu.

PERSONNEL

R. G. Clark, manager of the mutton and veal department, Cudahy Packing Co., Chicago, has retired. He is succeeded by Henry J. Dethlefs.

R. N. DuPuis, formerly assistant director, Miner Laboratories, Chicago, is now assistant director of research and development, S. C. Johnson & Sons, Inc., Chicago.

A. M. Femrite, Mandan Creamery, Mandan, N. D., was re-elected president of the North Dakota Dairy Industries Association at its recent convention in Grand Forks.

D. F. McGrath, Sugar Creek Creamery Co., Marshfield, Mo., is the new president of the Missouri Butter and Cheese Institute, following the recent annual meeting.

I. M. Hoagland, general manager of the Armour & Co. plant at Indianapolis, Ind., retired on Nov. 1, after 45 years in the meat packing business. He is succeeded by R. H. Borchers, who has been with the company for 22 years.

Dr. B. E. Horrall of the dairy department, Purdue University, has resigned to accept a position with Kraft Foods Co., Chicago. With the university for 18 years, Dr. Horrall was in charge of dairy chemistry research.

A. P. Hurwitz, formerly manager of the Cudahy Packing Co.'s South Chicago branch, has been appointed manager of the re-established Illinois district.

Charles P. McCormick, president of McCormick & Co., Inc., Baltimore, manufacturer of spices and flavors, has been awarded the annual national Human Relations Award by the Society for the Advancement of Management.

C. Parsons, in charge of dairy research, Swift & Co., Chicago, has retired. He is succeeded by J. D. Ingle.

A. E. Stevens, formerly with General Foods Corp., has been elected vice-president in charge of sales of Vacuum Foods Corp., with headquarters in New York.

John T. Stringer, manager of the fresh pork department of Cudahy Packing Co., Chicago, and an employee of the company since 1904,

from SUGAR to SAND

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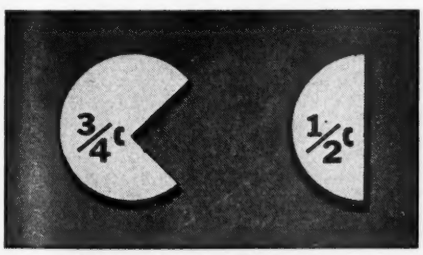
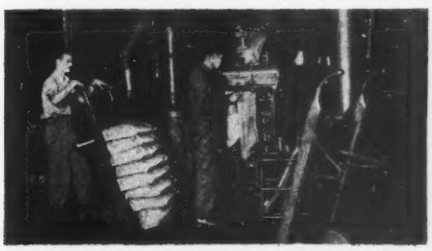


Case History No. 18—Producer saves ¾¢ per lb.; customer saves ½¢.

Case History No. 19 — Multiwalls protect against moisture-vapor penetration in transit and in storage.



Case History No. 20 — High-speed 152-PB valve bag filling machine gives cleaner, cheaper operation.

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retired Nov. 1. Irvin Widmier succeeds Mr. Stringer as manager of the fresh pork department.

Dr. Paul C. Trussell will take charge of the British Columbia Research Council's research on food products and other biological problems. His appointment marks an important addition to the services provided by the council in these fields. New laboratories are being specially equipped for the work at Vancouver, B. C.

W. C. Van Clief, citrus grower at Winter Haven, Fla., has been elected president of the Florida Citrus Exchange to succeed the late Charles H. Walker. Mr. Van Clief has served as first vice-president and was chairman of the personnel and advisory committee and headed the processing and canning committees. Phil C. Peters is the new first vice-president; A. V. Saurman is second vice-president and H. C. Allan and John L. Olson are third and fourth vice-presidents, respectively.

Frank C. Verbest, president of Blatz Brewing Co., Milwaukee, has been elected a director of Schenley Distillers Corp.

Marvin H. Walker, Lakeland, Fla., has been appointed general manager of the Florida Citrus Commission to succeed Robert C. Evans, who recently resigned.

DEATHS

Otto E. Blaurock, 72, retired Chicago packing official, recently, in Chicago.

Emil J. Brach, 88, president of E. J. Brach & Sons Candy Co., Chicago, recently.

Joseph M. Cudahy, 69, former president of Cudahy Packing Co., Chicago, and a director of the Morton Salt Co., recently, in Chicago.

Arthur G. Goelitz, 54, vice-president and production manager, Goelitz Confection Co., North Chicago, November 6.

A. C. King, 64, president of Citrus Products Co., Chicago, recently, in South Pasadena, Calif.

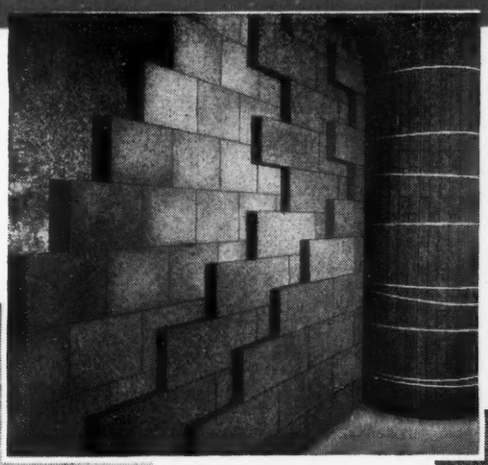
Bert Peters, manager, Beatrice Foods Co. plant at Fort Madison, Iowa, recently.

William Moore Scott, 74, vice-president of American Fruit Growers, Inc., and director of its operations in Florida and the southeastern states, recently.

R. A. Thompson, general manager of Thompson Biscuit Co., St. Louis, in an airplane crash, November 12.

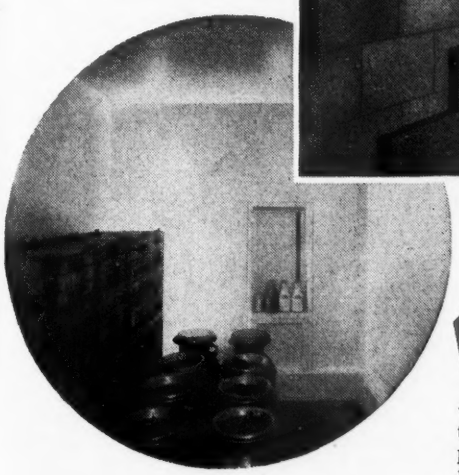
How Foamglas helps you to insulate problem cold rooms

Foamglas* is a rigid insulating block made up of millions of glass-walled cells. Because it is glass and, therefore, impervious to moisture penetration, it is particularly recommended for application where service conditions are severe. This efficient insulating material is also impervious to most gases and acids and is fireproof. It is suited to practically any construction where low temperatures are to be maintained. For complete details, write to Armstrong Cork Company, Industrial Insulation Dept., 4201 Concord Street, Lancaster, Pa.

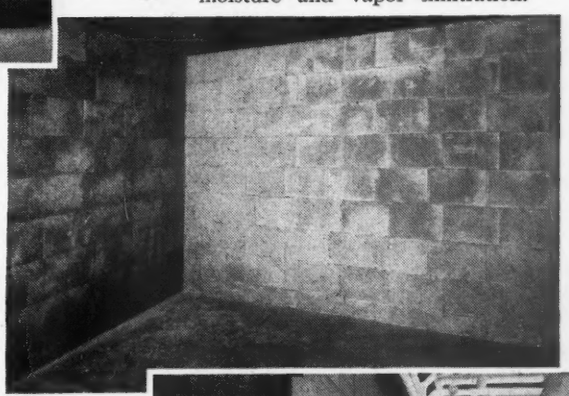


1. Extreme Temperature Differentials. Where it's warm outside the room and very cold inside, an insulating wall of Armstrong's Corkboard with an outside layer of Foamglas will prevent vapor infiltration.

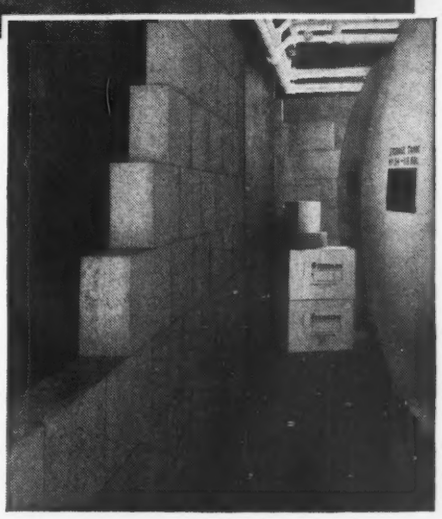
2. High-humidity Rooms. In ripening rooms and other extremely humid areas, walls of Foamglas insulation will eliminate the damaging effects of moisture and vapor infiltration.



3. Severe Cold-weather Areas. When a "cold" room is actually warmer than the outside temperature, Foamglas prevents moisture penetration of the insulation from inside the room.



4. Wet Floors. In areas where water is present, this waterproof glass insulation stays dry and efficient indefinitely. It also has sufficient strength to support heavy floor loads.



5. Against Uneven Walls. Where it's impractical to back-plaster a very rough outside wall, Foamglas can be erected as a free-standing wall. The wall shown at right is a full three stories high, and the blocks of Foamglas insulation are entirely self-supporting.

*® PITTSBURGH CORNING CORP.

ARMSTRONG'S INDUSTRIAL INSULATION

Complete Contract Service
For All Temperatures

From 300° Below Zero

To 2800° Fahrenheit

for
• SPRAYING • WASHING • RINSING • COOLING • AIR CONDITIONING

Get the most out of your Spraying Equipment with minimum power . . . with efficient spraying.

Use Yarway Nozzles. No internal vanes or other restrictions to clog or hinder flow. Two types—Yarway Involute-type producing a fine hollow spray with minimum energy loss, and Yarway Fan-type producing a flat fan-shaped spray with time-saving slicing action for cleaning.

Wide range of standard sizes and capacities. Cast or machined from solid bar stock.

Thousands in use. Write for new Bulletin N-616.

YARWAY SPRAY NOZZLES

YARNALL-WARING COMPANY
127 Mermaid Avenue, Philadelphia 18, Pa.

INVOLUTE-TYPE FOR HOLLOW CONE SPRAY

FAN-TYPE FOR FLAT SLICING SPRAY

Metal conveyor belts

tailored by CYCLONE for you!

CYCLONE can make its *three* basic belt styles (Chain Link, Flat Wire and Flex-Grid) in a wide range of metals, alloys, finishes, and mesh and wire sizes. Such an extensive range of belt constructions permits Cyclone engineers to design a metal conveyor belt to fit the particular operating conditions at your plant. When you wish to install a new belt or extend your present conveyor system, call the Cyclone office near you. Offices in principal cities . . . factories in the Mid-West and on the Pacific Coast. Write for new *free* catalog No. 4.

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CYCLONE FENCE DIVISION
(AMERICAN STEEL & WIRE COMPANY)
Dept. H-18, Waukegan, Illinois
United States Steel Export Company, New York

CYCLONE FENCE DIVISION • American Steel & Wire Co. • USS CYCLONE "Red Tag" CONVEYOR BELTS • UNITED STATES STEEL

UNITED STATES STEEL

C. Ernest Upham, 53, chief engineer, Walter Baker Div., General Foods Corp., Dorchester, Mass., November 13, in Milton, Mass.

Charles Hilliard Walker, 76, president of the Florida Citrus Exchange, October 12, at Bartow, Fla.

ASSOCIATED INDUSTRIES

Allis-Chalmers Manufacturing Co., Milwaukee, has named Harry A. Wright as engineer-in-charge of control sales of the control section of the company's electrical department.

Aluminum Seal Co., a wholly owned subsidiary of Aluminum Company of America, has a new president following the death of John E. Sharp. He is Max M. Kipfer, who has been with the Seal Company for 23 years. His headquarters will be in Richmond, Ind., new home of the subsidiary company.

The Baker Equipment Engineering Co., Inc., Charlotte, N. C., is planning the construction of a new $90,000 building to provide facilities for tripling its output.

Bemis Bro. Bag Co., Minneapolis, has announced the purchase of a 15-acre site in Hopkins, a suburb of Minneapolis, for the construction of additional plant facilities. The new plant will be managed by W. J. Geimer.

Carrier Corp. has moved into enlarged quarters in Charlotte, N. C., combining functions of sales, engineering, construction, industrial heating, dealer and service. R. S. Fullerton is manager of the office.

Economy Pumps, Inc., Hamilton, Ohio, has acquired from the War Assets Corp. the wartime addition to its plant, built by the Defense Plant Corp. The addition was built in 1942 at a cost of $705,000 to house an Economy subsidiary, Liberty Planers, Inc. The extension of manufacturing facilities makes possible an increase in the production of Economy Pumps and Klipfel Valves and furnishes large flow testing facilities for the Klipfel products.

The Liquid Carbonic Corp., Chicago, has announced the appointment of Byron W. Goulding as sales manager of the compressed gas division, with headquarters in New York.

New Jersey Machine Corp., manufacturer of labeling and paper box machinery, has announced the opening of a factory branch office in Los Angeles.

Now Available

A CONTINUOUS MIXER

The FLOW-MASTER Roto-Feed For The Food Industry

- **Stainless**
- **Sanitary**
- **Easy to clean**
- **Continuously and thoroughly mixes products even as viscous as bread dough**
- **Ideal for mixing many food products**

For Further Information Write:

MARCO COMPANY, INC., 14 THIRD ST., WILMINGTON 50, DEL.

Gentlemen:
We are interested in learning more about the new FLOW-MASTER Roto-Feed Continuous Mixer.

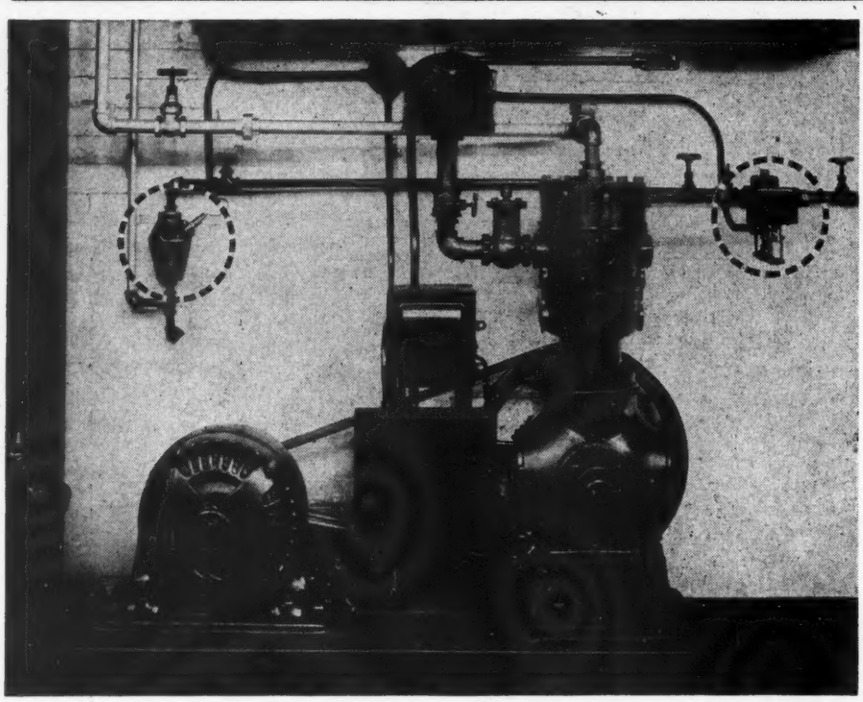
Name .....

Company .....

Address .....

MARCO COMPANY, Inc., 14 Third Street, Wilmington 50, Del.

FOOD EQUIPMENT NEWS



Compressor Control With New Solenoid Valve 1

IN further developing the compressor control announced some time ago, the Johnson Corp., Dept. I, Three Rivers, Michigan, now utilizes direct-operated solenoid valves to protect against any dangerous overheating and at the same time effect considerable water savings. The solenoid valve is a direct-operated type. It has no auxiliary pistons. It handles temperatures up to 400 deg. F., and in some sizes will operate under differential pressures up to 150 lb. This solenoid valve is used to admit water to compressor whenever the regulator on the storage tank calls for more pressure. The compressor itself is not started until water flows from the compressor and completes an electrical circuit with an electrode mounted in a holder on this discharge line. If the water does not flow, the compressor will not start, or if operating will stop immediately. When receiver is satisfied, compressor is stopped and the solenoid valve shuts off water.

Cooking Control 2

AN unfailing accurate check of every retort basket, that prevents the possibility of spoilage and loss resulting from uncooked canned goods, is made possible by the use of Cook-Chek retort tags. They are printed in purple, that changes to a green color only after prolonged exposure to moist heat, and is not affected by heat or adverse storage conditions. It is made by Aseptic-Thermo Indicator Co., Dept. I, Los Angeles 16, Calif.

Thermoplastic Labels 3

THERMO-KOTE, a new delayed action thermoplastic paper for labels, is announced by the Nashua Gummed and Coated Paper Co., Dept. I, Nashua, N. H. Unlike conventional thermoplastics, Thermo-Kote is preheated, then activated under pressure which results in higher speed labeling than was previously possible and elimination of the heating element in the label applicator. Recommended activation temperature 200 to 275 deg. F., application pressures 5 to 30 psi.

Wrap-Around Apron 4

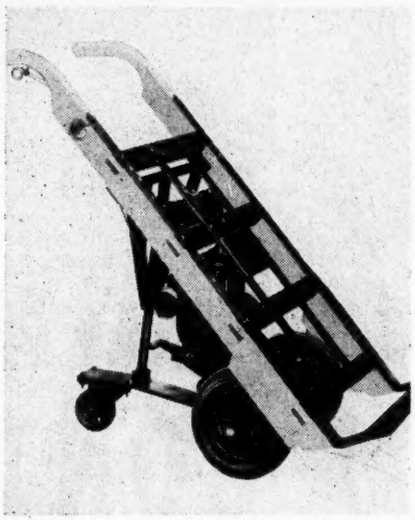
A WRAP-AROUND apron for women, with a fully reversible front that laps over 100 percent, does not flap open when walking nor gap when sitting is made by the Randles Mfg. Co., Dept. I, Ogdensburg, N. Y. It is made of soft, sturdy cotton, Sanforized for permanent fit. Seams are double stitched and bar-tacked at points of stress. The "Double Feature" is an efficient time and money saver as it halves laundering expense.

Industrial Roofing 5

PRODUCTION of a new, high-quality roofing material to meet the demand of industrial builders for an aluminum roofing and siding specifically adapted to factories, warehouses, storage depots, hangars and similar structures, is announced by Aluminum Company of America, Dept. I, Pittsburgh 19, Pa. Combining high strength, exceptionally high resistance to industrial atmospheres, minimum maintenance and reduced roof load, Alcoa industrial roofing will have a covering width of 32 in., allowing for a side lap of 1½ corrugations. It will come in standard 5-ft. through 12-ft. lengths, 0.032 in. thick.

Motorized Hand Truck 6

A THREE-WHEEL motorized hand truck, which is powered by a 4-cycle 1½ hp. Briggs-Stratton gas engine,



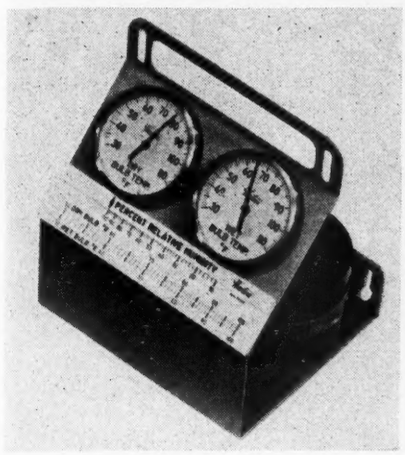
is produced by Comet Mfg. Co., Dept. I, Minneapolis 9, Minn. Full chain drive and centrifugal clutch transmit power through a jack shaft to the heavy duty demountable rubber-tired wheels. Throttle control is operated by the right thumb, giving the operator a choice of speeds from 2 to 5 m.p.h. under capacity loads. Accommodates loads of over 2,000 lb., with power to haul 1,500 lb. up short grades.

WRITE FOR MORE INFORMATION

Food Industries Reader Service now makes it easy for you to follow up the news on new equipment and new materials. Tear-out coupon cards are supplied for your convenience on the special colored page which follows the equipment news section in this month's issue. Enter your requests, fill out and mail cards, and let Reader Service do the rest.

Humidity Indicator 7

A NEW quick-reading all-metal humidity indicator, designed for use in industry and laboratory, has been announced by the Weston Electrical Instrument Corp., Dept. I, Newark, N. J. The instrument is of the wet and dry bulb type, featuring all-metal Weston laboratory thermometers, a self-supporting wet-bulb wick covering the thermal element, sturdy all-metal construction, and a simplified slide-rule calculator giving relative humidity readings directly. The only maintenance necessary is to change the wick occasionally and replenish the water in the reservoir, which is a heavy walled, large-capacity jar covered to reduce undue evaporation. The slide rule calculator, indicates relative humidity from 10 to 100 percent. One movement and the proper setting is made. The percent humidity is shown immediately.

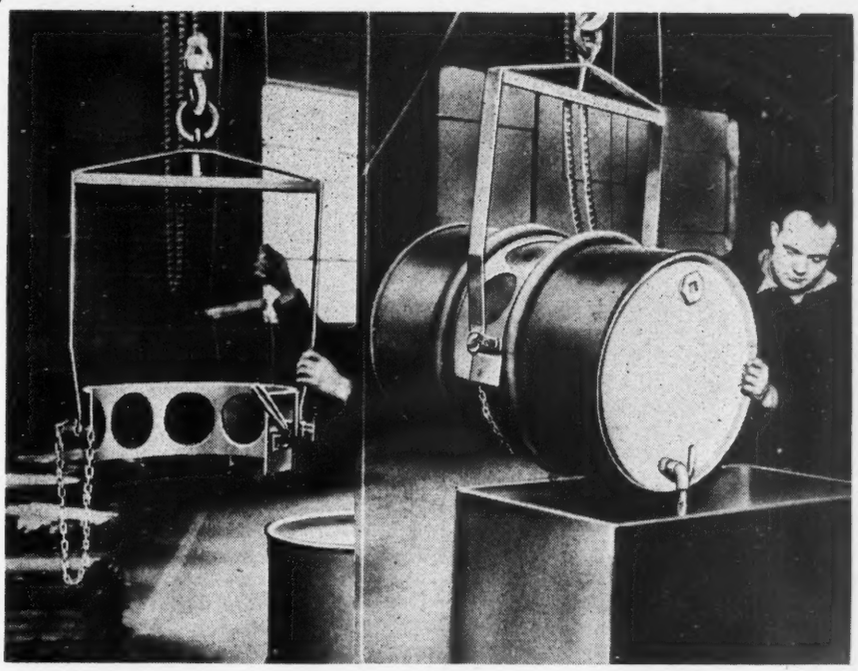


Steam Cleaner Unit 8

A NEW utility model Hypressure Jenny steam cleaner has just been announced by the Hypressure Jenny Div., Homestead Valve Mfg. Co., Dept. I, Coraopolis, Pa. In addition to super cleaning capacity and low price, the new unit features instant starting; simplicity of design and operation; rugged welded unit construction; complete accessibility of all working parts; continuous electric spark ignition; non-clogging heating coil and pressure atomizing oil burner. A choice of either oil or natural gas burner, and electric motor driven or gasoline engine driven mechanism, make the new unit adaptable to most operations.

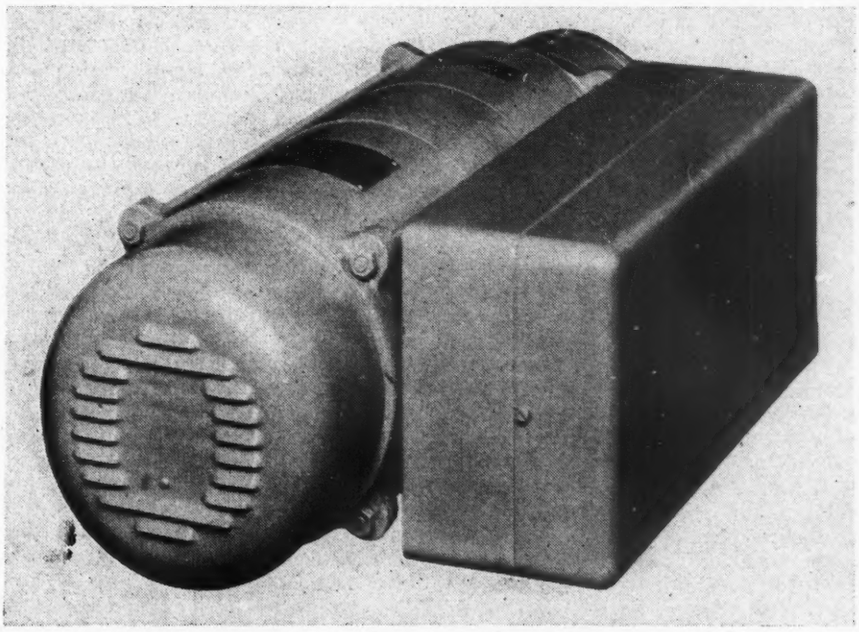
Indicating pH Meter 9

THE Macbeth Corp., Dept. I, New York 11, N. Y., announces a new explosion-proof, line operated, direct reading, continuous indicating pH meter designed in accordance with Class 1, Group D requirements for use in atmospheres containing gasoline, petroleum, ethyl alcohol and acetone. The instrument is provided with a connection for operating a recorder at a remote position.



Drum Handling System for Monorail or Crane 10

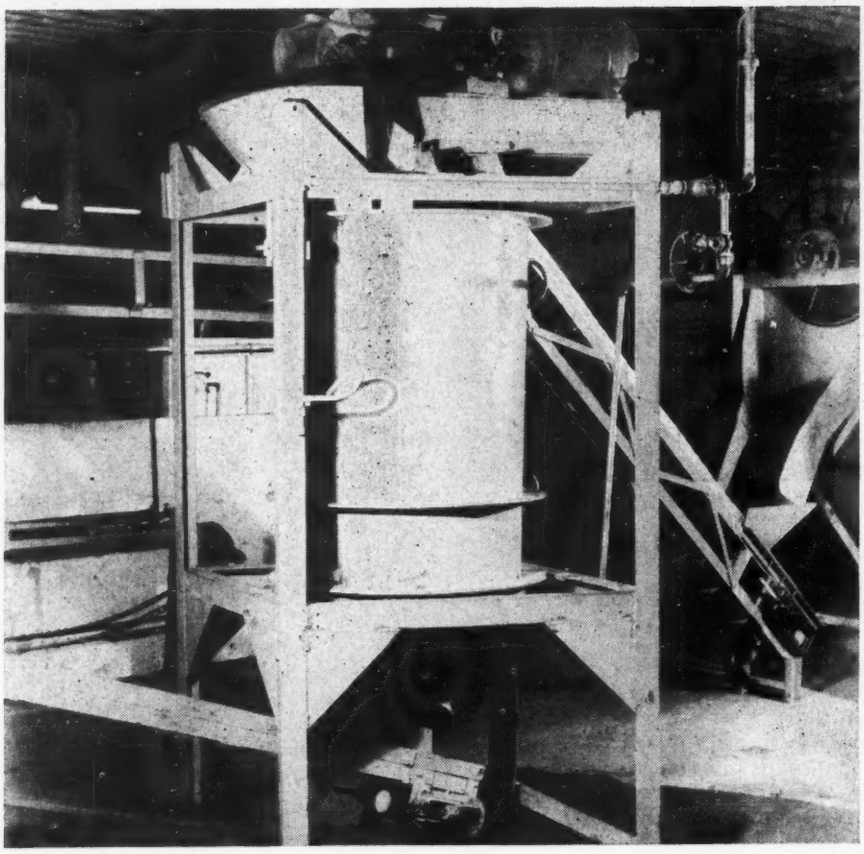
A RUGGED low-cost tool which makes an efficient drum handling system out of any monorail hoist, crane and chain fall, is announced by the Falstrom Co., Dept. I, Passaic, N. J. To use, the Drum-Karrier, as it is called, is hooked onto the hoist, moved to position, cinched around drum and transported where needed. Positive tilt locks hold drum in vertical position and permit easy, controlled tilting to mix or dispense contents over receiving tank. It is designed and built for long hard service with heavy-duty all steel construction. Rapidly operated by one man.



High-Gain Electronic Power Supply for DC Motors 11

A NEW electronic amplidyne consisting of a high-gain balanced d.c. electronic amplifier and a motor amplidyne has been announced by the Motor Div. of General Electric Co., Dept. I, Schenectady 5, N. Y. Designed for use as a regulated adjustable-voltage power supply for d.c. motors up to 1½ hp., and as a regulated exciter for larger adjustable-voltage drives up to 200 hp., the new equipment has an output of 1½ kw., 250 v., and is arranged for use on either a 220-, or 440-v., 3-phase, 60-cycle power supply.

The electronic amplidyne makes possible a speed range of 20 to 1 or greater. It maintains speed closely at any setting, regardless of load conditions and reduces starting shock on the driven machine by means of current limit control of acceleration and stalled current. Quick-stopping without undue stress to motor or driven load is provided by suicide braking.



Machine Makes Small Beets From Large Ones 12

A PROCESS, designed to give the canner a greater return on his large beets by converting them into small globular shaped beets of a size equal to 40 count whole beets in No. 2 cans, has been developed by Canning Machinery, Inc., Dept. I, Rochester 6, N. Y. Beets, 3 in. or larger in diameter, are scalded, peeled and trimmed in the regular manner. They are then diced into 1-in. cubes and the imperfect cubes graded out. Cubes are then conveyed into the Globule Beet Machine which rounds the pieces into spheres. Spheres are polished in the reel, inspected and canned. The machines and the name "Glo-Beets" will be licensed to canners.

Battery Charger 13

A NEWLY perfected, portable combination battery charger and arc welder is announced by the Larkin Lectro Products Corp., Dept. I, New York 30, N. Y. This unit is available in two models: The Larkweld 77, a 30 amp. charger and 75 amp. welder; and the Larkweld 77-PFC, a 10 amp. charger and 55 amp. power factor corrected welder. They have a sturdy transformer construction, are attractively priced, come in modernistically designed case, and are sold complete with accessories.

Variable Pitch Sheave 14

A SOLID steel fractional hp. variable pitch sheave providing finer adjustments through use of 20 threads instead of the present customary 16 has been announced by Dodge Mfg. Corp., Dept. I, Mishawaka, Ind. All sizes will be available in three standard bores: ½, ⅝ and ¾ in. The ½ in. bore sheave is provided with a set screw only, but the ⅝ and ¾ in. bores have keyway and set screw.

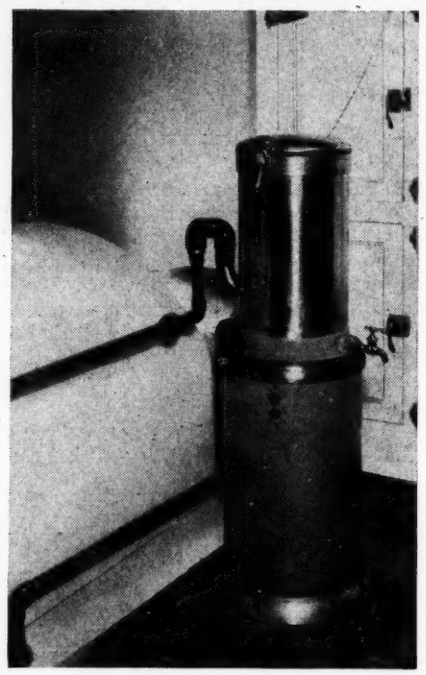
Stainless Beer Keg 15

A STAINLESS steel beer barrel, weighing approximately 31 lb., has just been introduced by Pressed Steel Tank Co., Dept. I, Milwaukee, Wis. Improved foot rings and rolling hoops are securely welded around the complete circumference of the keg. Handling has been made easier by the light weight and the deep reinforced chime which affords a positive, secure grip. Kegs can be handled more rapidly, and damage from slipping and dropping is minimized.

Yeast Emulsifier 16

A NEW type emulsifier which makes it possible for emulsified yeast to be automatically mixed and piped directly to the dough mixer, and eliminates the unsanitary and inefficient method of bucket handling, is being manufactured by the Yeast Emulsifier Co., Dept. I, Los Angeles, Calif.

Water is piped directly from the meter to the emulsifying machine. The yeast, vitamins and admixes are added through a convenient opening on the top of the emulsifier which has a hermetically sealed cover. A propeller located at the bottom of the unit mixes the yeast. After a mixing time of less than 1 min., the motor is turned off and the balance of the mixing water from the meter passes directly through the emulsifier to the mixer. In this process the yeast is distributed thoroughly through the total amount of water for each mix, rather than through only a small amount of water.



All parts of this equipment that come into contact with the yeast water are made of stainless steel. Capacity of holding tank is 15 gal. Propeller is powered by a ¾ hp. electric motor. Shipping weight, 200 lb.

Corrosion Inhibitor 17

MORPHOLINE, a volatile compound that inhibits corrosion due to CO_2 in steam and condensate-return lines of steam heating or processing systems, is once again available, according to Carbide and Carbon Chemicals Corp., New York 17, N. Y. It evaporates with water in definite proportions, so that any desired alkaline value in the steam generated can be maintained by adjusting the concentration in the boiler. Only small amounts of the chemical are required to inhibit corrosion effectively.

FRESH

A smart way to keep foods fresh is to wrap them in Patapar* Vegetable Parchment.

Patapar has high wet-strength. It resists grease. It is odorless, tasteless, pure of texture.

Patapar wrappers are furnished plain or printed with brand names and colorful designs.

*Reg. U. S. Pat. Off.

The Patapar Keymark nationally advertised symbol of wrapper protection.

Wrapped in Patapar foods keep fresher

Paterson Parchment Paper Company • Bristol, Pennsylvania

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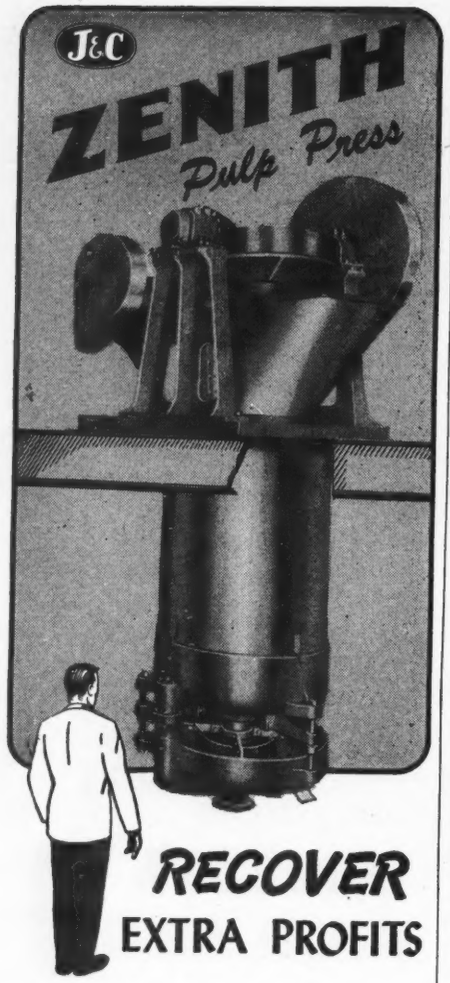
BRANCH OFFICES: 120 BROADWAY, NEW YORK 5, N. Y. • 111 WEST WASHINGTON ST., CHICAGO 2, ILL.



RECOVER
EXTRA PROFITS

... by Increasing
PRESSING EFFICIENCY

New uses for the Zenith Pulp Press are being discovered every day. Among the many installations for DEWATERING are: BEET PULP • PINEAPPLE • TOMATO POMACE • CORN GERM and FIBRE • VEGETABLES • BREWER'S GRAIN CHERRIES • CITRUS FRUITS • FISH • PAPER PULP RECLAIMED RUBBER • TANKAGE • etc.

100% continuous... from storage bin to pressed cake, the Zenith Pulp Press dewaters up to 26 tons of wet pulp per hour.

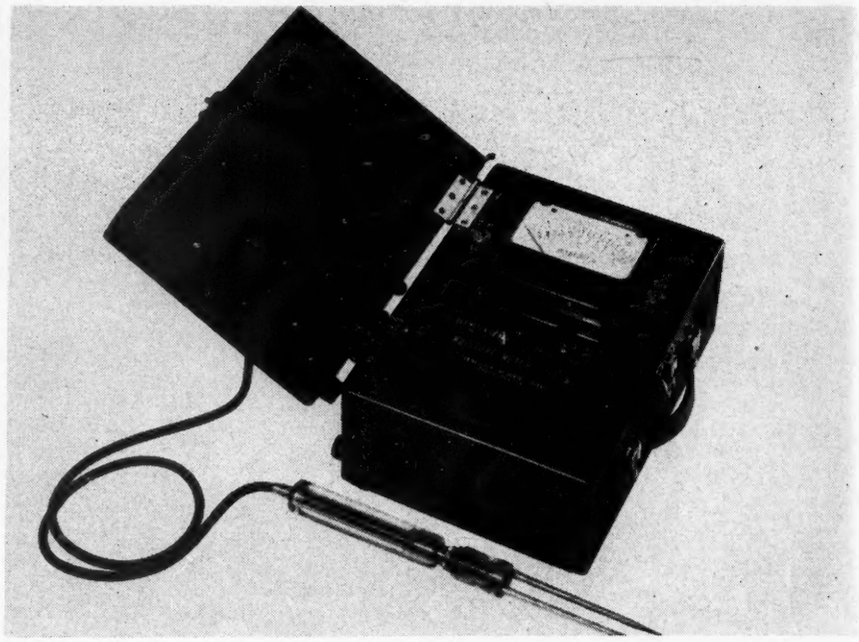
The material is fed mechanically to a tapered screw-type spindle that compresses and forces it through the press, discharging liquid through the central orifice and pressed cake to conveyor for disposal.

Constantly rolling pulp assures maximum dewatering. Heater resistors permit steam injection.

A Pilot Press is available for trial in your plant.

"Work Well Done Since '81"

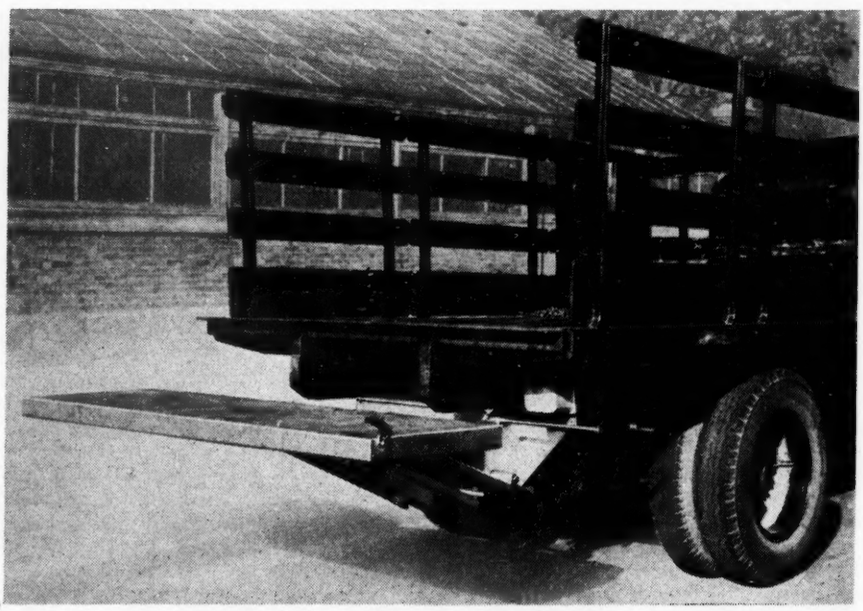
A PRODUCT OF
Jackson & Church Co.
SAGINAW, MICHIGAN



Battery Operated Moisture Meter 18

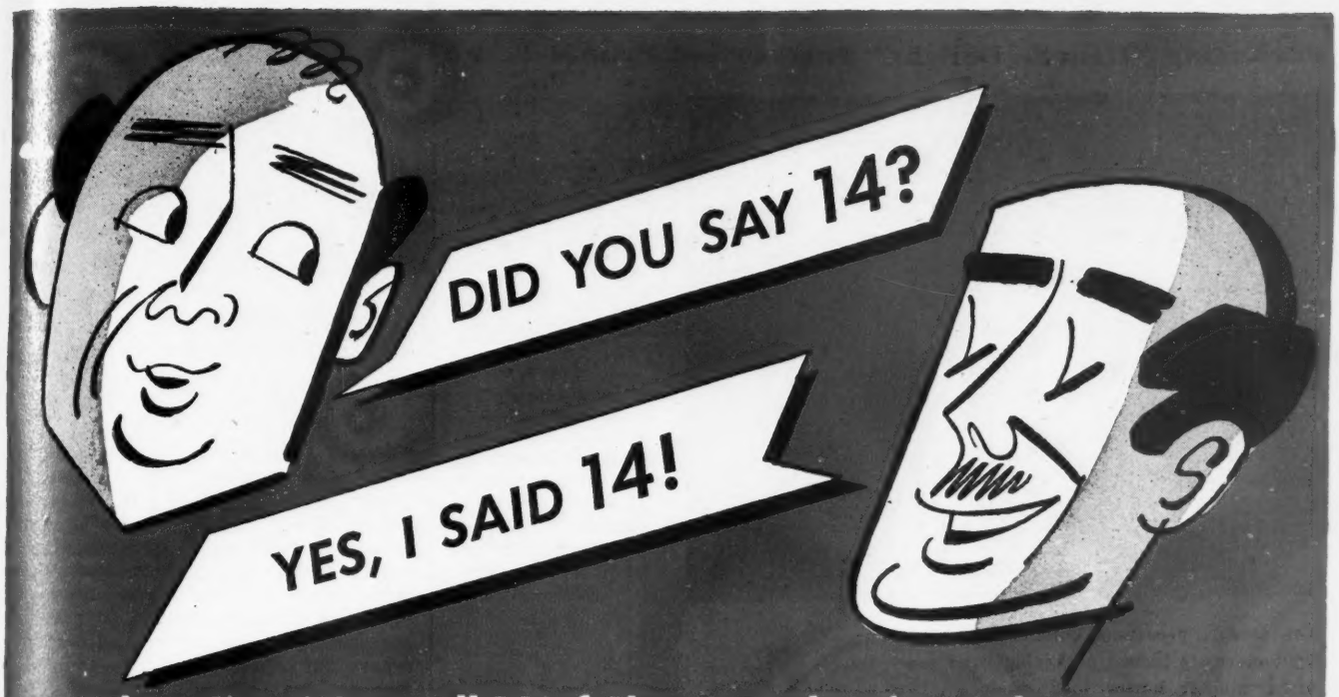
A BATTERY-OPERATED moisture meter, which measures the resistance to the flow of an electric current through the material being tested, is announced by Thwing-Albert Instrument Co., Dept. I, Philadelphia 44, Pa. Current flow through the meter is amplified by the use of an electronic circuit, and the readings are indicated on a scale in terms of percent moisture.

The meter is calibrated by weighing the material to be tested, and then measuring its electrical resistance. This process is repeated, with varying amounts of moisture, until the range of the instrument is covered. Zero on the scale is based on the electrical resistance of the material while in an oven-dry condition. Tests are made by pushing the points of the probe into the material, or holding them against a surface with steady pressure. Indications are immediate.



Tail Gate Truck Loader Saves Labor, Breakage 19

A HANDY, low-priced hydraulic tail gate loader for standard 1½-ton trucks has been introduced by The Day Co., Dept. I, Chicago 21, Ill. The lift platform operates over the full distance from the ground to the truck floor level, raising and lowering loads up to 1,200 lb. It remains level throughout its entire travel arc, and swings up to serve as a tail gate when the truck is on the road. The hydraulic pump is driven from the truck's standard power take-off, and is controlled by a convenient lever, or the pump can be operated with a hand lever. The unit is furnished in a complete package and takes only a few minutes to install.



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Specify VisQueen* Polymerized Ethylene Film

Flexible at extremely low temperatures	✓	Economical	✓
Great tear resistance	✓	Non-toxic	✓
Waterproof	✓	Tasteless—odorless	✓
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Sealable with heat	✓	Made in clear seamless tubing or sheeting in specified widths	✓

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PRESTON DIVISION, TERRE HAUTE, INDIANA

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Packaging "Heart's Delight" Pasteurized Prunes . . . .

Operators trimming overfilled cartons to 1 lb. net. Heart's Delight Pasteurized Prunes, Richmond-Chase Co., San Jose, California.

New modern processing combined with top flight moisture locked packaging have produced another better food product . . . Heart's Delight Pasteurized Prunes. Graded for size, precooked under pressure and soundly packaged to preserve original moisture, tenderness and flavor this product reaches the consumer in perfect condition. The weighing operation is different, too. Fillers are set for slight overfill and operators trim overweight only to 16 oz. net on EXACT WEIGHT high speed Scales.

INDUSTRIAL PRECISION
Exact Weight Scales
THE EXACT WEIGHT SCALE COMPANY
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Leaky Pipe Joints Cost You Money – Stop Them With KEY-TITE

Pipe joints sealed with Key-Tite save you money for they positively will not leak. It contains no lead or lead substitutes and does not affect the taste or odor of potable liquids. Key-Tite is a perfect seal on all lines carrying water, gas, low-pressure steam, compressed air, etc. Joints are easily opened, too, for it will not freeze in the joint.

SEND FOR LIBERAL FREE SAMPLE. Try it in your plant at no cost, see for yourself. You will be amazed at the results.

KEY Company
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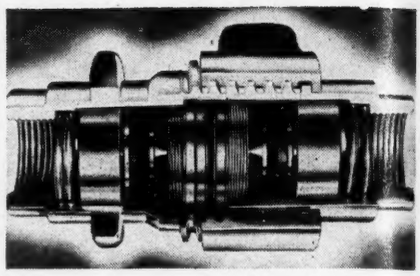
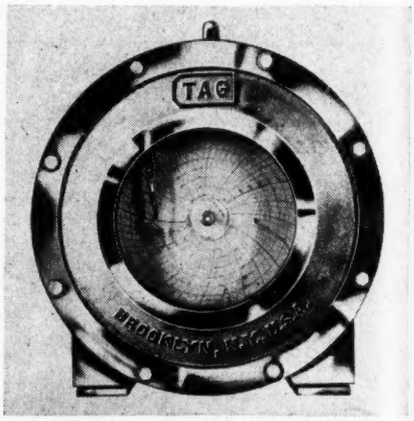


New Coupling 20

A QUICK-DISCONNECT COUPLING, developed early this year for use on Freon refrigeration units and field tested since May is now being marketed by Paxton-Mitchell Co., Dept. I, Omaha, Nebr. Fabrication from extruded brass bar stock eliminates the possibility of porosity. Fast Acme thread permits rapid opening of the union joint; dual valves which are self-closing as the union joint is broken and amply guided to prevent possible cocking in the guides, increase the efficiency of the coupling. Engineering and design provides for relieving of pressure between the valves while being disconnected and for trapping only a minimum of air between the valve seats when making the union. Valve seats are of Freon-resistant Neoprene. Coupling is made in ½, ¾, 1 and 1½ in. sizes.



Traveling Recorder 21

C. J. TAGLIABUE MFG. Co., Dept. I, Brooklyn 5, N. Y. has announced a number of improvements in its traveling recorders used for permanently recording temperatures of liquid food such as grape juice, milk and ketchup as they pass through the pasteurizer. The instruments are designed especially for spray-type pasteurizers but are equally adaptable to basket types. Rigidly supported temperature bulbs are of stainless steel and bottle clamps are adjustable for various sizes of packages. The improved model retains all the other standard features; including: positive pen lifter; pen arm bracket supported at both ends; positive micrometer pen adjustment; safety link for range protection; chart knob for easy removal and visible recorder pen arm with removable fountain pen.

The accuracy and versatility of many pH instruments are limited by the electrode system – *BUT NOT BECKMAN EQUIPMENT!*

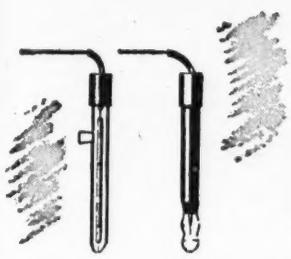
...THE INDUSTRY'S MOST COMPLETE LINE OF MODERN pH ELECTRODES IS AVAILABLE FOR USE WITH BECKMAN pH INSTRUMENTS

REMEMBER THIS important fact about modern pH equipment —glass electrode pH instruments are the most advanced and efficient type of pH equipment obtainable. *But no glass electrode instrument is better than the versatility, accuracy and dependability of the electrode assemblies available for use with it.*

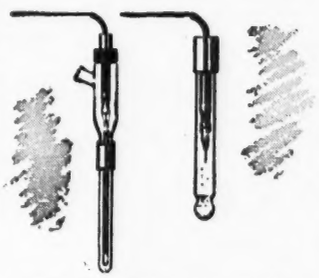
And that is another of the many vital advantages that are yours when you select BECKMAN pH Instruments—for Beckman, *pioneer of modern glass electrode pH equipment*, not only provides the finest and most advanced pH instruments, but also the industry's most complete line of electrodes for use with these instruments.

Illustrated below are only a few of the more than 90 different types of interchangeable Beckman pH Electrodes that assure maximum accuracy, convenience and wide-range adaptability to users of Beckman pH Meters—the pH instruments that are the recognized standard of the industry.

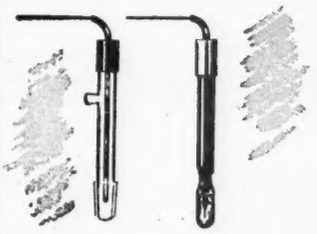
No matter what *your* pH problem, there is a Beckman pH Instrument and a Beckman Glass Electrode assembly to meet your exact requirements for both industrial and research applications. So why restrict your operations with anything less than the *complete* pH facilities provided by Beckman?



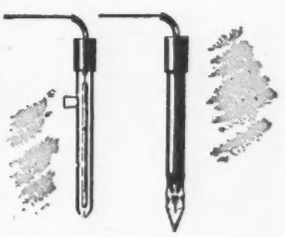
HIGH pH GLASS ELECTRODES. Pioneered by Beckman, these glass electrodes permit accurate measurement of high pH solutions with negligible error *even in the presence of sodium ions.* Ideal for use on detergents, soaps and many other applications where regular glass electrodes are useless.



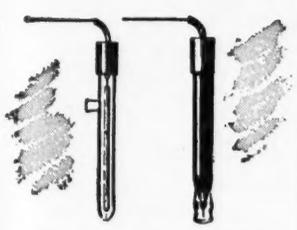
HIGH TEMPERATURE GLASS ELECTRODES. Another development pioneered by Beckman, these electrodes can be used directly in high temperature process solutions to 100° C. (212° F.) without damage. Eliminates special sampling devices and greatly simplifies control of hot processing solutions.



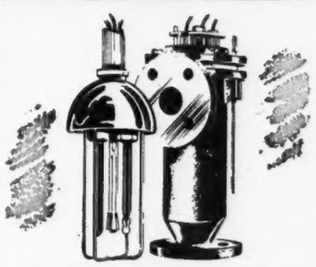
RUGGED DUTY GLASS ELECTRODES. Still another Beckman development, these electrodes are specially designed for direct immersion in tanks and flow lines where abrasion is severe (paper pulps, ore slurries, etc.). Not only abrasion resistant, but also withstand more than 100 lbs. pressure on immersion end.



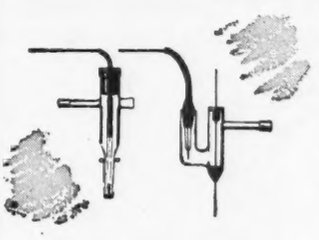
PENETRATION TYPE GLASS ELECTRODES. The pointed application end greatly simplifies direct pH measurements of cheeses, fish, fruits and similar semi-solids where penetration of outer surface is desired for internal pH measurements.



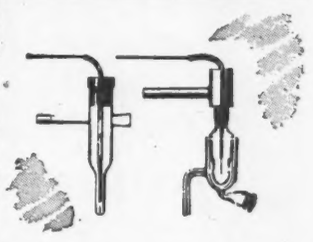
SURFACE TYPE GLASS ELECTRODES. On these Beckman electrodes the application end is nearly flat in order to simplify pH measurements on skin, hides and moist surfaces of materials where pH measurements of outer surfaces are desired.



IMMERSION AND FLOW TYPE ASSEMBLIES. Can be placed directly in flow lines, vats, tanks, etc., to permit direct and continuous pH measurements on process solutions. Far simpler, quicker and more accurate than sampling devices. Can be used with various types of Beckman electrodes.



MICRO GLASS ELECTRODES. One of dozens of specialized Beckman pH electrodes for science and laboratory investigations. This type permits quick, convenient and accurate pH measurements on samples of less than one drop.



HYPODERMIC GLASS ELECTRODES. One of many specialized Beckman pH electrodes for medical use. In this type, 0.5 ml blood samples can be injected from hypodermic needle through membrane with minimum exposure to air. Other types are also available.

THE ABOVE ARE ONLY TYPICAL of the wide selection of glass electrodes available for use with Beckman pH Instruments . . . one more reason why Beckman pH Instruments are recognized throughout the world for their dependability, accuracy and versatility. *Beckman Instruments, National Technical Laboratories, South Pasadena 18, Calif.*

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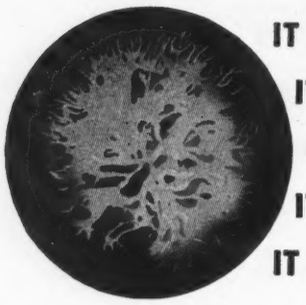

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IT SUSPENDS . . .

We are now producing from Carragheen two new improved types of gelose. One of them should be the answer to your emulsifying, suspending, thickening or stabilizing problems.

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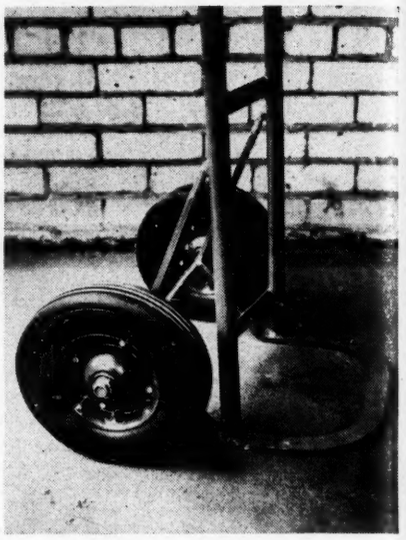
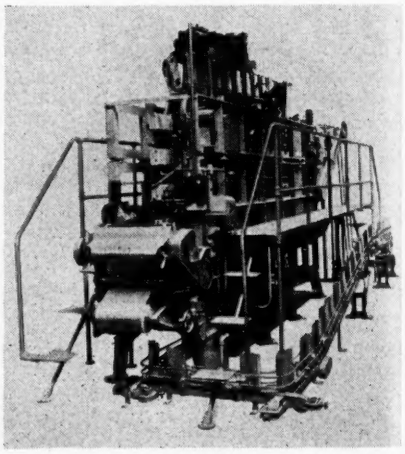


Rubber Tired Truck 22

A NEW zero-pressure rubber tire is now available as an additional choice of wheels on the Wheel-Ezy metal hand truck manufactured by The Rapids-Standard Co., Dept. I, Grand Rapids 2, Mich. The new wheel is of 10 in. dia., 2½ in. size, and is grease packed for easy rolling. The tire has heavy sidewalls, and a hollow core. Weight is 7 lb. per wheel.



Package Machine 23

A PACKAGE machine which automatically feeds out a flat carton, creates an inner liner, seals the sides and bottom of both liner and carton, then places the finished carton upright on a conveyor ready for filling, at speeds from 75 to 90 per min. is announced by Battle Creek Bread Wrapping Co., Dept. I, Battle Creek, Mich.

The Model 100, as it is called, forms the inner liner from wax or plain glassine, waxed sulphite, parchment, foil laminated or duplex papers. It seals the folds either by heat or with glue. As the carton shell is formed, the sides of the liner are securely adhered to its inside walls, the side flap is glued and the bottom seal is made. Pressure up to 1½ tons is then exerted on the bottom flaps to force the glue into the fibers of the carton.

STEAM at Your Finger-Tip?

This is a size A-125 — 125 h.p. AMESTEAM Generator equipped for burning light oil.

AMESTEAM GENERATOR

YOU enjoy true "pushbutton" control with the AMESTEAM Generator—the completely automatic, self-contained packaged steam unit with 80% operating efficiency.

AMESTEAM Generators require a minimum of supervision, no labor for fuel handling or ash removal, and no banked-fire periods. You start operation with a pushbutton, and the unit delivers full steam pressure in a few minutes.

Available in sixteen sizes from 10 to 300 h.p., and in pressures from 15 to 200#, AMESTEAM units may be provided to burn heavy or light oil, or gas or may be provided with both oil and gas burners for your advantage in situations of fluctuating fuel supply and cost.

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IF you are handicapped by insufficient steam capacity, obsolete boiler equipment, fuel difficulties or labor shortage, you may find an AMESTEAM Generator to be your answer. Write today for specific information on a generator for your needs, or for general bulletin describing all sizes.

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Company.....
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Type of Business.....
Estimated Capacity Needed.....

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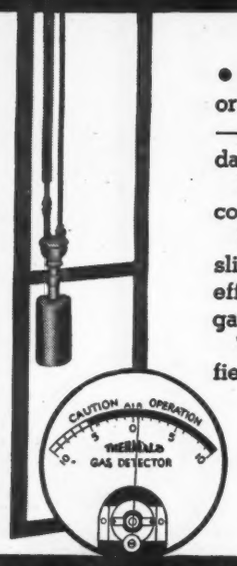

• This new instrument detects unburned gas, from leaks or incomplete combustion—indicates the concentration—and operates an automatic gas shut-off well before the danger point is reached.

It operates during idle periods as well as through the combustion cycle . . . 24 hours a day.

So sensitive is the detector that its dial indicates even slight deviations from the correct fuel mixture. Equally effective for mixtures of flammable gases with inert gases—and for air-gas atmospheres.

The Thermalo Gas Detector is furnished for any specified type of gas fuel: manufactured, natural or bottled gas.

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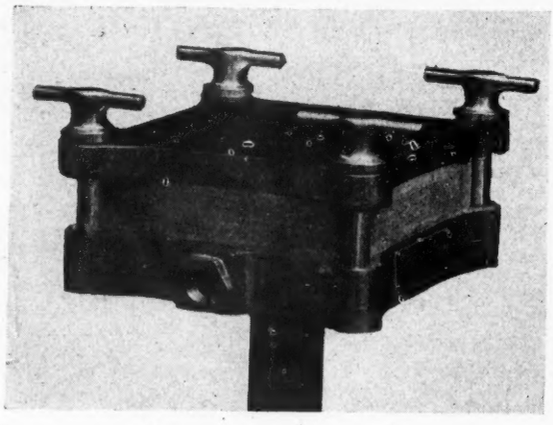

Immediate Delivery

See for yourself the kind of job this filter will do in producing clear, sparkling water! From 200 to 1000 gallons per hour . . . for larger flows filters may be hooked up in series. Rustproof; floor space 1'6" x 1'6". Cartridge filter medium is a laminated block about 1½" thick through which at spaced intervals 20 layers of Rapid-Flo long-fibred cottons are stretched. Cartridges give minimum of 20,000 gallons of water when sand and other type filters are used before the polishing Rapid-Flo . . . some processors secure 40,000 gallons before replacing cartridge.

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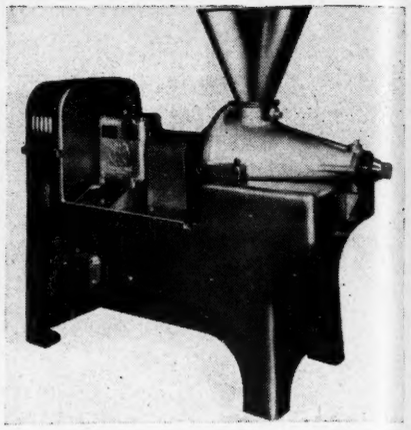
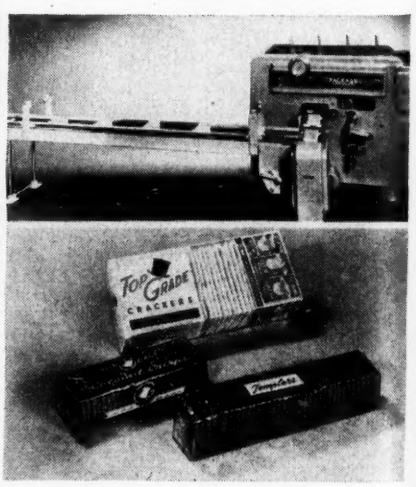
Dept. F, 22-24 Wooster St. New York 13, N. Y.



Continuous Mixer 24

A NEW continuous mixer, designed to eliminate batch mixing in the process industries, is announced by Marco Co., Inc., Dept. I, Wilmington, Del. Known as the Roto-Feed continuous mixer, the equipment will handle products ranging from the viscosity and density of bread dough to liquids as fluid as water. When the product has undergone the mixing cycle, it may be directed to any subsequent processing equipment. According to the manufacturer, all this occurs continuously. It is only necessary to proportion the desired ingredients into the Roto-Feed, and they emerge thoroughly mixed at a controlled rate of 5 to 1,000 gal. per hr.

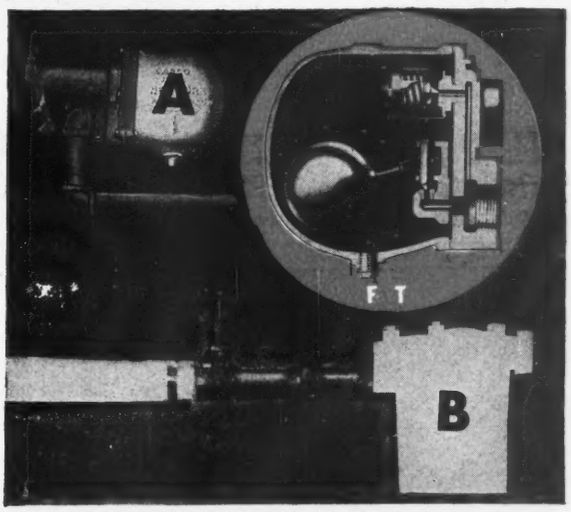


Wraps Without Trays 25

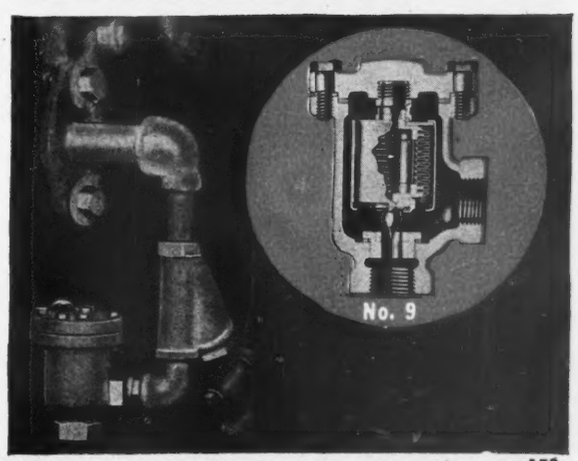
PRODUCTS such as soda crackers, graham crackers and square-type sandwich cookies can now be wrapped without cardboard or trays on the Universal Model 4 machine developed by the Package Machinery Co., Dept. I, Springfield, Mass. The machine can also apply the special wrap with "zipper" opener developed by Milprint, Inc. This wrap provides a cap which can be slid back on the crackers after the package has been opened. It will handle a wide range of package sizes. Changes from one size to another are made by the adjustment of a single handwheel.

"NEXT TIME WE WILL GET THE RIGHT TRAP—FIRST"

This 300 barrel brew kettle never did work right with the large old fashioned steam traps originally installed (see illustration "B" at right). When plant output was stepped up something had to be done. The small inexpensive Sarco Float-Thermostatic Trap (A) now drains the largest coil in the kettle and everything is OK.



On the large bottle washing machines, two other types of traps were tried without success, and then all troubles were ended with the new Sarco No. 9 Thermostatic Steam Trap shown at the right. The Brewmaster has decided that hereafter he will see Sarco first.



It costs no more—actually much less in the long run, to get the right combination of steam traps and temperature control. Sarco makes all types—a family of products that works together on any specific job. The Sarco Representative can show you how.

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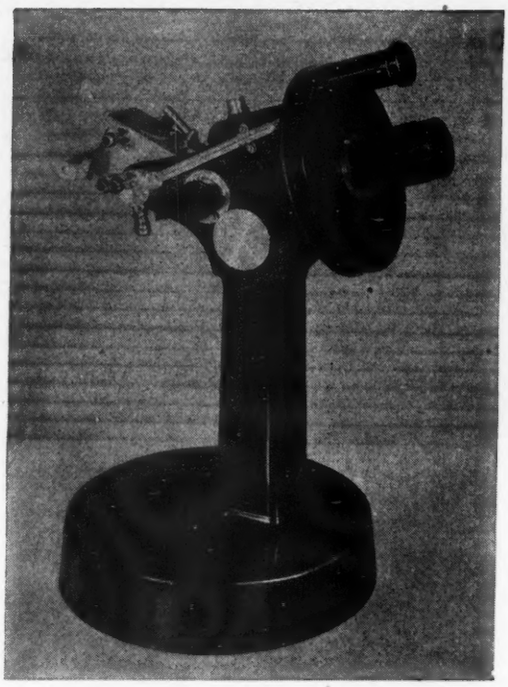

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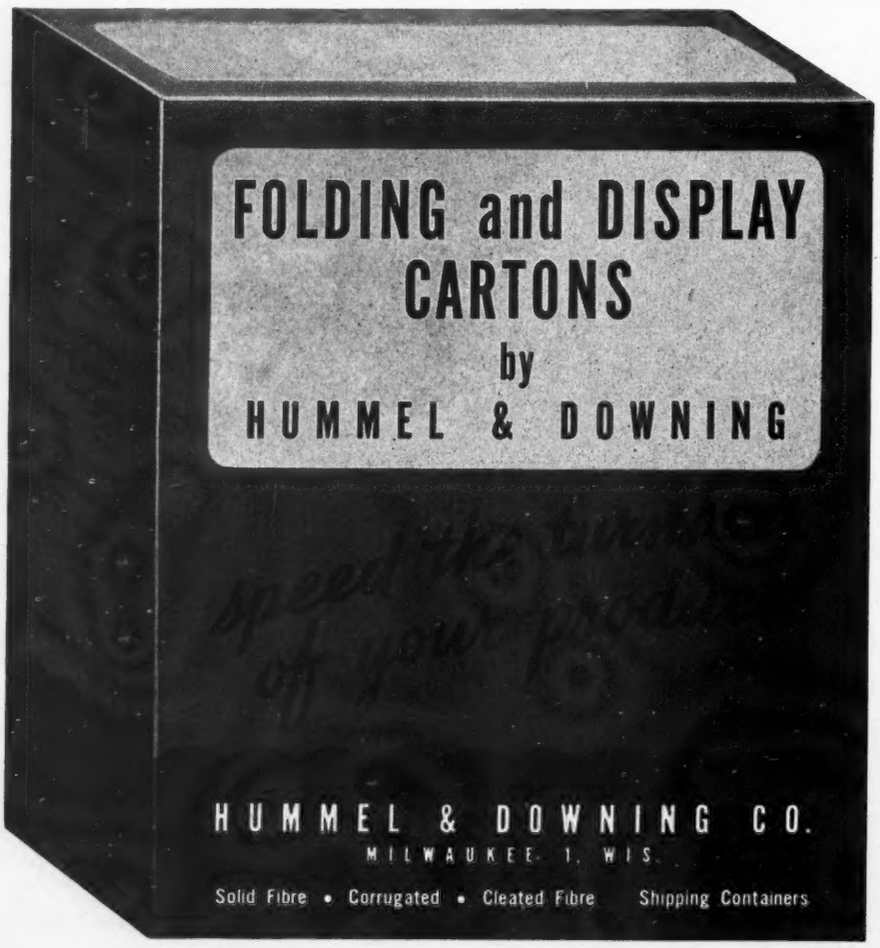

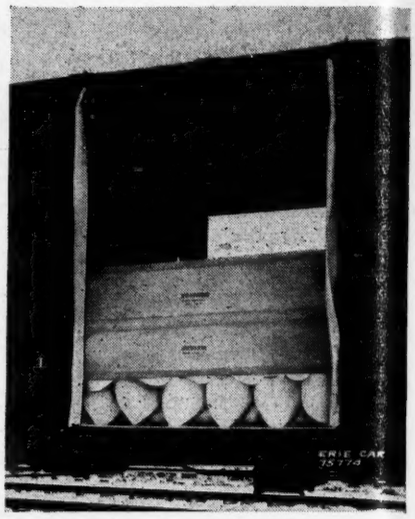

Car Door Retaining Strip 26

A CAR door retaining strip, which replaces the conventional type door barricade, has been perfected and tested by Signode Steel Strapping Co., Dept. I, Chicago, Ill. Instead of lumber, strips of laminated, heavy-duty, water-repellent kraft liner board, reinforced with ¾ in. by 0.02 Signode steel strapping, are nailed across the door opening inside the car. Depending upon the characteristic and weight of load, the strips may be butted, overlapped or spaced for maximum efficiency. Light in weight, the average dunnage for a car door will range from 10 to 20 lb., the strips measure 18x84 in. With the substitution of smooth-surfaced retaining strips for wood constructed door bracings, damage to cartons, boxes, bales, bags and bundles from snagging and ripping on sharp edges and corners and protruding nails disappears. Unloaders need only snip the steel bands on the retaining strips.

Corrosion-Proof Valves 27

CRANE Co., Dept. I, Chicago, Ill., announces new lines of corrosion-resistant alloy globe valves and gate valves in size 2½, 3, 4, and 6 in. with flanged ends. Valves are available in 18-8 Mo and in monel metal, and are designed for working pressures to 150 psi. liquid or gas and working temperatures up to 350 deg. F.

Viscometer Attachment 28

AN extension spindle which extends the usefulness of the Synchro-Lectric viscometer has been announced by the Brookfield Engineering Laboratories, Inc., Dept. I, Stoughton, Mass. Point of process readings can be taken with this device where it was formerly impossible, due to physical conditions which prevented the operator or instrument from getting close enough to make the reading. The spindle is also of value since it goes far enough below the surface to be unaffected by surface motion, and readings are said to be independent of depth of immersion within wide limits.

CATALOGS, BULLETINS

This digest of manufacturers' new publications is offered by FOOD INDUSTRIES Reader Service as a convenience for executives. The editors feature catalogs, data sheets and technical pamphlets likely to interest purchasing agents, superintendents, packaging men and food technologists.

Food Plant Equipment

Steam Generation 51
Cyclotherm Corp.—8-page bulletin 28 explaining the principle of cyclonic combustion and heat transfer employed by their steam generator.

Doughnut Mixer 52
Reynolds Electric Co.—Bulletin 622 describing the RECO automatic doughnut mixer and the RECO combination mixer-filler for making mayonnaise and salad dressings.

Beverage Coolers 53
Jensen Machinery Co., Inc.—4-page bulletin No. 50 describing the beverage coolers engineered and manufactured by this firm.

Sausage Cutters 54
John E. Smith's Sons Co.—20-page catalog S-C "Buffalo Silent Cutters." Describes and illustrates the complete line of sausage cutters made by this company.

Air Diffusers 55
W. B. Conner Eng. Corp.—32-page bulletin K-20 describing and illustrating Kno-Draft adjustable air diffusers for control of air conditioning performance.

Screw Pumps 56
Sier-Bath Gear & Pump Co.—20-page catalog giving descriptions, capacities and uses of the internal and external screw pumps made by this company.

Power Boilers 57
Kewanee Boiler Corp.—16-page, 4-color booklet on "Operation and Care of Kewanee Power Boilers."

Filter Press Bulletin 58
Valley Foundry & Machine Works, Inc.—16-page bulletin describing filtering operations, materials of construction and the five major filter press models made by this company. The new hydraulic closing device for use in connection with its own or other filter presses is described in detail.

Packaging Machinery 59
George G. Rodgers Co., Inc.—4-page folder illustrating and describing this company's equipment for filling packages. Lists specifications.

"Gyro-Centric" Screens 60
Patterson Foundry and Machine Co. —New 12-page bulletin on Patterson "Gyro-centric" screens for dry screening, separating, classifying, cleansing, reclaiming, and general dry process work, and for wet sifting or screening of liquids and dewatering operations.

Pancake Motor 61
Fairbanks, Morse & Co.—16-page bulletin 2760 describing and illustrating the new Axial Air Gap motor made by this company.

Texrope Drives 62
Allis-Chalmers Mfg. Co.—New 144-page, indexed catalog for pre-engineered stock Texrope drives. More than 22,000 stock drives for all applications from 1 to 150 hp. are listed. Drives for all horsepowers, motor speeds, ratios and driven speeds have been accurately pre-engineered and are systematically listed. Recently announced new pitch diameter sizes of B and C Magic-Grip sheaves are used in many of these drives and have greatly increased stock drive selection possibilities.

Ion Exchange 63
A new method for producing sugar sirups at decisive savings over the old, conventional methods is described in a

12-page, 2-color illustrated booklet entitled "Better Sugar Syrups by Ion Exchange," just published by the American Cyanamid Co.

Oil Pumping Units 64
National Airoil Burner Co., Inc.—16-page bulletin No. 40 describing and illustrating the complete line of fuel oil pumping and heating units made by company.

Flexible Couplings 65
Dodge Mfg. Corp.—8-page bulletin A-410 illustrating and describing the new Dodge Taper-Lock flexible coupling with the well-known Taper-Lock bushing which has been used so successfully on V-belt sheaves.

Built-In Motors 66
The Louis Allis Co.—16-page illustrated bulletin No. 516-D describing their line of type "CT" rolled shell, shaftless squirrel cage induction motors for built-in drives with details of electrical and mechanical features, mounting, ventilation and applications.

Process Equipment 67
Blaw-Knox Co.—24-page illustrated bulletin 2204 entitled "Complete Plants and Equipment for the Process Industries." Applications reviewed include fat splitting, oil and fat hydrogenation and solvent recovery.

Conveyor Belts 68
The Cambridge Wire Cloth Co.—56-page booklet containing a series of articles on woven wire conveyor belts for industrial applications.

Materials Handling

Conveyors 69
A. B. Farquhar Co.—12-page, 2-color catalog illustrating and explaining their complete line of freight and package handling conveyors. Of special interest is the Model 435 FM, which incorporates an all-steel streamlined boom construction with a Fleximount truck for utmost portability and maneuverability.

Materials Handling 70
Lewis-Shepard Products, Inc.—86-page, 3-color Materials Handling Catalog No. 23. It contains large size illustrations of each type of this company's equipment with installation photographs reproduced in duotone.

Magnesium Deckboards 71
Magnesium Co. of America—4-page illustrated folder describing Magcoa light weight magnesium deckboards which replace heavy steel plates formerly used as a bridge between loading dock and freight cars and trucks.

Control Equipment

Thickness Gage 72
Sperry Products, Inc.—6-page data sheet describing this companys gage for thickness measurement and inspection of bond. Contains explanations and diagrams showing its principle of operation.

Instruments 73
Commercial Research Laboratories, Inc.—Bulletin 905, a 4-page leaflet discussing the performance, design and accuracy of this companys flowmeter. Contains a labeled diagram of the instrument. Considers installation, operation, maintenance and application.

Steam Specialties 74
Wright-Austin Co.—4-page bulletin No. CI 47 on steam traps, steam separators and other steam specialties. Described in detail are three traps suitable for pressures from 0 to 250 psi discharging at varying rates from 300

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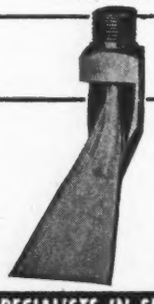

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to more than 6,000 lb. of water per hr. on intermittent service, or double these rates on continuous discharge.

Flow Meter 75
American District Steam Co.—12-page illustrated bulletin No. 35-83A on the ADSCO flow meter of the orifice type for indicating, recording and integrating the flow of steam, gas and air.

Controlled Heat 76
Leslie Co.—4-page folder illustrating and describing their new line of self-contained, self-acting temperature regulators.

Weigh-Feeder 77
Builders Providence Instruments—Bulletin D8-550.35, a 4-page leaflet diagraming and picturing the scales made by this company for continuous weighing of dry materials on conveyor belts. Presents the principle of operation. Includes typical specifications.

Regulators 78
Grove Regulator Co.—6-page folder picturing and describing this company's check valves. Contains diagrams showing the dimensions of the various models and their operation.

Thermocouple Gage 79
National Research Corp. — 4-page leaflet describing this company's line of thermocouple gage controls. Lists physical and operational specifications for each.

Solenoid Contactor 80
Ward Leonard Electric Co.—4-page bulletin 4451 describing and illustrating the new Size 1 a.c. Solenoid Contactor made by this company.

Gas Analyser 81
Gow-Mac Instrument Co. — 4-page folder describing this company's unit for analyzing gas by measuring thermal conductivity.

Pyrometer 82
Pyrometer Instrument Co.—4-page leaflet describing the surface pyrometer made by this company. Contains photographs of the instrument with various attachments.

Plant Supplies

Multiwall Paper Bags 83
St. Regis Paper Co.—No. 18 in the series of "Case Histories" concerning the economy of multiwall paper bags.

Odor Control 84
Oakite Products, Inc. — "Scientific Odor Control," an article appearing in the July-August issue of *Oakite News Service*, provides interesting data on Tri-Sanite, a specialized material combining the ability to clean, disinfect and deodorize.

Packings 85
The B. F. Goodrich Co. new catalog section on its line of packings. Describes and gives data on various types of super-heat compressed asbestos sheet packing, rubber sheet packing, cloth inserted packings and Koroseal sheet packing.

Protective Coatings 86
Amercoat Div., American Pipe & Construction Co.—12-page catalog giving complete details on the chemical and physical properties, application instructions and other pertinent data on protective coatings. Catalogs are available for 10 major industries, giving full technical information pertaining to each industry.

Food Plant Cleaner 87
American Oil & Disinfectant Corp.—6-page illustrated folder describing Whistleclean, a fast-acting, economical

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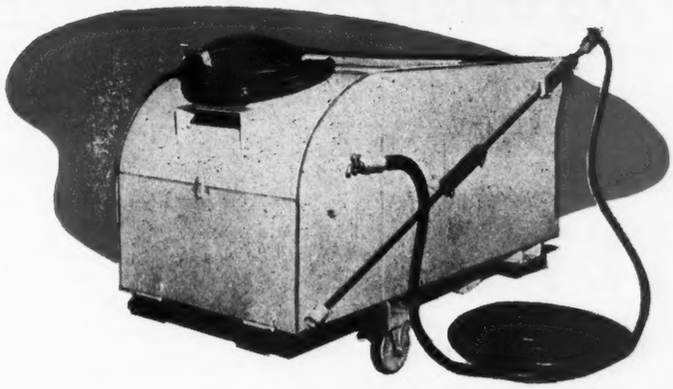
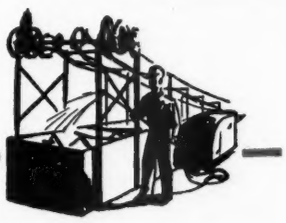
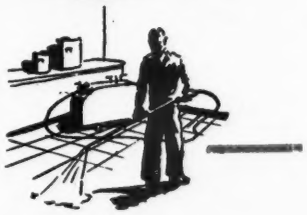


. . . the Oakite Hot-Spray Unit and one man!

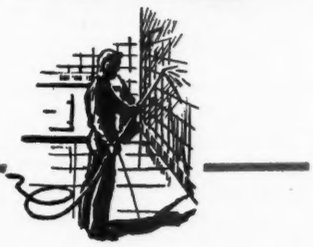


COOLING CHANNELS



WASH FLOORS

PAINTSTRIP EQUIPMENT



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cleaner for food and meat packing plants, bakeries and confectioners.

Oil Filters 88
Purolator Products—New 16-page illustrated catalog on oil filter applications for general industrial and machine tool use.

Miscellaneous

Door-Frame Booklet 89
Pittsburgh Plate Glass Co.—8-page booklet describing the revolutionary new metal door-frame assembly for use with Herculite glass doors. Includes variable dimension tables and typical section views.

Air Drill 90
Ingersoll-Rand Co.—Form 4065, describing and illustrating the Utility Jackhamer designed and built for general utility and plant maintenance work.

Tube Fitting 91
The Parker Appliance Co.—76-page handbook on the selection, sizing, layout and installation of metal tubing circuits. It makes available all the basic data underlying the specialized technics required for the design and speedy installation of long-life, leakproof systems. Contains size selection charts based on the flow required, pressures handled under varying services, and temperature conditions for meter and instrument systems.

Nickel Alloy 92
The International Nickel Co., Inc.—36-page revised illustrated booklet "Engineering Properties and Applications of NI-Resist." It gives detailed information on the physical and mechanical properties of this widely used cast nickel alloy. Performance under conditions involving corrosion, heat, and wear is described. Corrosion data for 400 corrosive media are presented in tabular form. Completely indexed.

Package Sealing 93
A handy guide to more efficient shipment sealing and tape application has just been published by Better Packages, Inc. It covers the subject of sealing as applied to corrugated shipping containers and parcel post packages, and points out the advantages of gummed tape as a closure method when correctly moistened and properly applied. Fifteen diagrammatic illustrations present the tape application story and demonstrate how to achieve a pilferage prevention seal.

Packaging 94
"How to Engineer Corrugated Shipping Boxes" is the latest addition to the "Little Packaging Library," a series of reference handbooks by The Hinde & Dauch Paper Co. The method employed in a Hinde & Dauch package laboratory, in the construction and design of new types of corrugated boxes and in the solution of general packaging problems, is described.

Effective Printed Matter 95
John Maher Printing Co.—24-page illustrated booklet, "Preparing Effective Printed Matter for Latin-America." Subjects discussed are: Number of languages needed; original writing vs. translation; preparation of direct mail for distribution in Latin America; catalog requirements; Latin-Americans as prospective customers.

Stainless Steels 96
Jessop Steel Co.—12-page booklet describing Jessop stainless steels and heat-resisting steels. Includes chemical analyses, physical properties, corrosion resistance rating and fabricating properties of standard types of steel.

FOOD TECHNOLOGY

NEW DISCOVERIES AND INVENTIONS

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QUALITY CONTROL

Starch Determinations

THE theoretical factor, 0.90, for converting the dextrose, obtained from starch by hydrolysis with hot HCl, to starch has been found substantially correct. By studying the effect of normal HCl on dextrose at 212 deg. F., it was shown that one hour's heating at that temperature results in a progressive loss of reducing power that continues on further heating. The loss is linear with time and amounts to about 8 percent in 12 hours.

To obtain complete hydrolysis of starch, 2½ hr. at 212 deg. F. in N-HCl is barely sufficient; the A. O. A. C. conditions of 2½ hr. at 158 deg. F. may be insufficient. For lintnerized wheat starch, heating on a boiling water bath in normal HCl 3 or 4 hr. gave complete conversion of the starch. The dextrose obtained was multiplied by 1.02 for a 3 hr. heating, or 1.04 for 4 hr. to correct for dextrose destroyed. The total dextrose was then multiplied by 0.90 to convert it to starch.

Digest from "Starches and Starch Fractions. Part II. The Determination of Starch by Hydrolysis with Hydrochloric Acid," by L. H. Lampitt, C. H. F. Fuller and N. Goldenberg, *Journal of the Society of Chemical Industry*, vol. 66, 117-21, April, 1947.

FISH

Trimethylamine in Fish

TRIMETHYLAMINE oxide, which occurs in all sea fish, is reduced to trimethylamine by bacterial action. Presence of the latter compound has been proposed as a chemical means of indicating spoilage. Storage of homogenized fish muscle of several species at 59 deg. F. shows that trimethylamine oxide disappears completely in the first 2-4 days of storage, while the trimethylamine content continues to rise, indicating its formation from other sources than the oxide. The oxide is also reduced by metallic iron, tin or tin plate, aluminum and by nascent hydrogen in either acid or alkaline solution. This has a bearing on the trimethylamine content of canned fish products.

Winter herring, processed for various times in unlacquered tin cans at temperatures of 194-266 deg. F., showed that the breakdown of the oxide is accelerated by the higher sterilizing temperatures. All of the oxide was reduced to trimethylamine in 2-3 months of storage in tinplate cans; aluminum cans took longer. After reduction of the oxide initially present in the fish, formation of additional trimethylamine takes place very slowly—only 10-20 mg. of equivalent amine nitrogen in two years.

Discoloration of canned fish products by formation of tin sulphide is retarded by the presence of trimethylamine oxide, but may occur after the oxide is reduced. The reducing atmosphere and the maturing process that occur in canned fish products are delayed by the presence of trimethylamine oxide in the can.

Digest from "Trimethylamine Oxide in Marine Products," by O. A. Ronald and F. Jakobsen, *Journal of the Society of Chemical Industry*, vol. 66, 160-66, May, 1947.

BAKING

Stability of Fats In Baked Goods

ALTHOUGH much work has been done with antioxidants to retard the rancidity of fats, relatively little attention has been given to compounds that show ability to stabilize fats in baked goods. A proposed laboratory method has been devised to determine in advance which antioxidants are likely to prevent deterioration of fat in the baked product. Crux of the method is the fact that antioxidants mostly soluble in fat and relatively insoluble in water will retard the oxidation of fat after use as shortening in bakery products.

Laboratory procedure involves dissolving an antioxidant in lard, heating the mixture, and filtering out any undissolved material. Equal quantities of lard solution and water are then boiled together and transferred to a separatory funnel to remove the water layer. The fat layer is then extracted with alcohol. From the quantity of antioxidant in the alcoholic extract, and the amount found in a similar extract of the original lard solution, the quantity remaining in the lard after hot water extraction can be calculated. If a relatively large part of the antioxidant remains in the fat phase, it is likely to carry over its effectiveness in baked goods. Correlation was found between this laboratory test and bakeshop results.

Digest from "A Laboratory Method for Determining the Ability of Antioxidants to Stabilize Fat in Baked Goods," K. F. Mattil and H. C. Black, *Journal of the American Oil Chemists' Society*, vol. 24, 325-27, October, 1947.

Dried Egg In Sponge Cake

FEW dried egg powders of 5 percent moisture will produce a sponge cake of good quality. By combining the meringue ingredients and slowly heating them to 155 deg. F., then whipping in a water bath at 176 deg. F., satisfactory foams may be obtained and the quality of the cake improved.

The 5 percent moisture powder rapidly deteriorates at 100 deg. F. Cakes made from it after 28 days storage were judged inedible. Addition of baking powder improved the cakes made from powders 14 to 28 days old, but decreased the scores for texture and flavor of cakes made with fresh egg powder. Determination of sulphydryl groups in the egg powder indicated progressive denaturation of the protein during

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the period of storage at 100 deg. F.

Freshly prepared, spray dried, whole egg powders of less than 2 percent moisture were variable in quality. This was indicated by degree of denaturation as well as by their ease of foam production, cake volume and cake quality. Satisfactory meringues were made by heating to 155 deg. F. and whipping in a water bath at 113 deg. F.—much cooler than for the 5 percent moisture powders. Only vacuum-dried powders prepared from frozen eggs yielded cakes comparable to those obtainable with fresh eggs.

Digest of "Lifting Power of Dried Whole Egg When Used in Sponge Cake," by C. F. Miller, B. Lowe and G. F. Stewart, *Food Research*, vol. 12, 332-42, July-August, 1947.

Lecithin in Baked Goods

EXPERIMENTS have been undertaken to determine the effect of lecithin in bread doughs, and thus settle some of the controversy surrounding the use and benefits of lecithin in the baking industry. These shop tests disclosed that the use of lecithin reduced mixing time and yielded an increase in absorption due to its emulsifying action. It produced drier doughs that required less dusting flour, and insured against buckiness regardless of the flour used. Lecithin-containing doughs had greater elasticity and smoothness, comparable to the effect obtained by increased shortening. The crumb texture was more uniform and finer, and the loaves were more uniform in shape. The use of lecithin delayed staling by enhancing the value of the shortening used. Through its emulsifying action, it produced more uniform and evenly textured bread. Further delay in staling was produced by the formation of a lecithin-protein complex with good water-retaining properties, and by increasing the water-proofing properties of the film of fat covering the starch and gluten network of the crumb.

Digest from "Practical Application of Lecithin in Bakery Products," an address by F. E. Walrod at the 23rd annual meeting of the American Society of Bakery Engineers, Chicago, Ill., March 11, 1947.

FATS and OILS

Oil Bleaching Process

CONTINUOUS bleaching of oil with a pulverized adsorbent is described in recent patent specifications. Feature of the process is a 2-stage treatment of the oil-adsorbent mix-

(*Continued on page* 196)

bouillon-flavoring problem?

GRANULATED BOUILLON

Granulated Bouillon is composed of Tastone Seasoning and Saroma Yeast-Vegetable Extract, blended with salt, vegetable fat and spices. Contains vitamin B-complex in its natural form. An excellent dry-type flavoring used by many food producers. Especially suitable for incorporation into dehydrated soups and related products.

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A bouillon product which consists only of hydrolized vegetable proteins (proteins converted into amino acids). Has a neutral flavor. Used for sauces, gravies, dehydrated soups, etc. The new type Glutamino has been decolorized.

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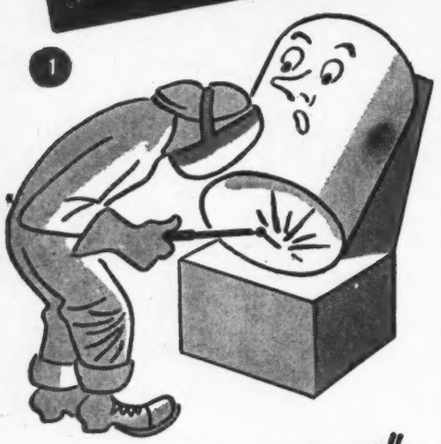

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ture, in which it is first deaerated and steam-stripped at normal or low temperature for the removal of oxygen and moisture, before it is heated to a temperature of 220-325 deg. F. for final refining. The filtered product is claimed to be superior to that obtained by a single-stage, high-temperature process.

Soaps and other hydratable colloids are more readily mixed with the adsorbent and removed in the filter. In operation, oil and adsorbent are proportionally mixed and sprayed into a deaerating chamber from which the mixture passes through a heater before being atomized in a second chamber which is also under vacuum. The heated mixture is then filtered and cooled.

Digest from U. S. Patent 2,428,082, issued September 30, 1947, on an application dated November 10, 1941, to Robert R. King, Samuel E. Pack and Floyd W. Wharton, Sherman, Tex., and assigned by mesne assignments to Mrs. Tucker's Foods, Inc.

VITAMINS

Ascorbic Acid Stability

STABILITY of ascorbic acid in packaged foods such as beverages and beverage bases, candy, jams and jellies, cereal products, gelatin, meat and dairy products, has been measured. In beverage powders—fruit, coffee and cocoa—the loss was insignificant, even after six months' storage at 100 deg. F., while in liquid beverage bases the loss was practically complete. Palatability and vitamin stability seem to be related, the least palatable beverage materials suffering the greatest ascorbic acid loss.

Hard candies, containing citric acid, held their initial additions of ascorbic acid after a year at 100 deg. F., while non-acid hard candies underwent about 40 percent loss in the same time. Soft candies and chewing gum lost about 70 percent in 6 months and maintained that level. Jams and jellies lost ascorbic acid steadily during a 6-month test period, making them undesirable carriers of the vitamin. Dry cereals and cookie fillings (hydrogenated fat, sugar and flavoring) proved to be good carriers, retaining 50 to 95 percent of their ascorbic acid after a year. Fruit cake, on the other hand, lost over 90 percent during baking.

Cheese, and cheese and meat spreads, lost about 50 percent of their added ascorbic acid in 3 months. It was difficult to get satisfactory distribution of the crystalline vitamin in these products.

The losses sustained were true

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losses of ascorbic acid and not changes to dehydro-ascorbic acid. All stable carriers retained palatability, but poor carriers were not necessarily unpalatable. Losses were in general related to the methods of manufacture and to the structure of the food carrier. The harder and more impenetrable the material to air and moisture, the more stable it was as a carrier for vitamin C.

Digest from "Stability of Ascorbic Acid in Various Carriers," by S. Brenner, V. O. Wodicka and S. G. Dunlop, *Food Research*, vol. 12, 253-69, July-August, 1947.

DAIRY

Ion Exchange Process For Evaporated Milk

INSTABILITY of evaporated milk has been shown to be due to an unbalance between calcium and magnesium ions, on the one hand, and citrates and phosphates on the other, with calcium and magnesium in excess. It is customary in the evaporated milk industry to balance this system by the addition of disodium phosphate, and thus control the heat stability of the product. Another logical approach to the problem, however, seemed to lie in the application of the mineral-ion exchange principle, and an investigation along that line was carried out over a period of a year. The cationic exchanger used in the experiments was a resinous type known as Amberlite IR-100.

In processing milk by the mineral-ion exchange (MIE) process, both whole raw milks and skim milks were treated and used in experiments with evaporated milk. The advantage of using a dried MIE-treated skim milk was soon demonstrated and most of the trials were made with this material. About 60 percent of the calcium is removed in passing milk through the cation exchanger; and since the correction of the salt equilibrium was very slight in most milks, only a small percentage of MIE-treated milk was required to produce stability in evaporated milk during sterilization. As a result of 16 separate experiments it was concluded that the MIE process will stabilize evaporated milk against coagulation during sterilization, and that the product will have characteristics similar to those obtained from the use of stabilizing salts. Where 2 to 6 oz. of stabilizing salt per 1,000 lb. of concentrate were required to produce stability, the same correction was effected by

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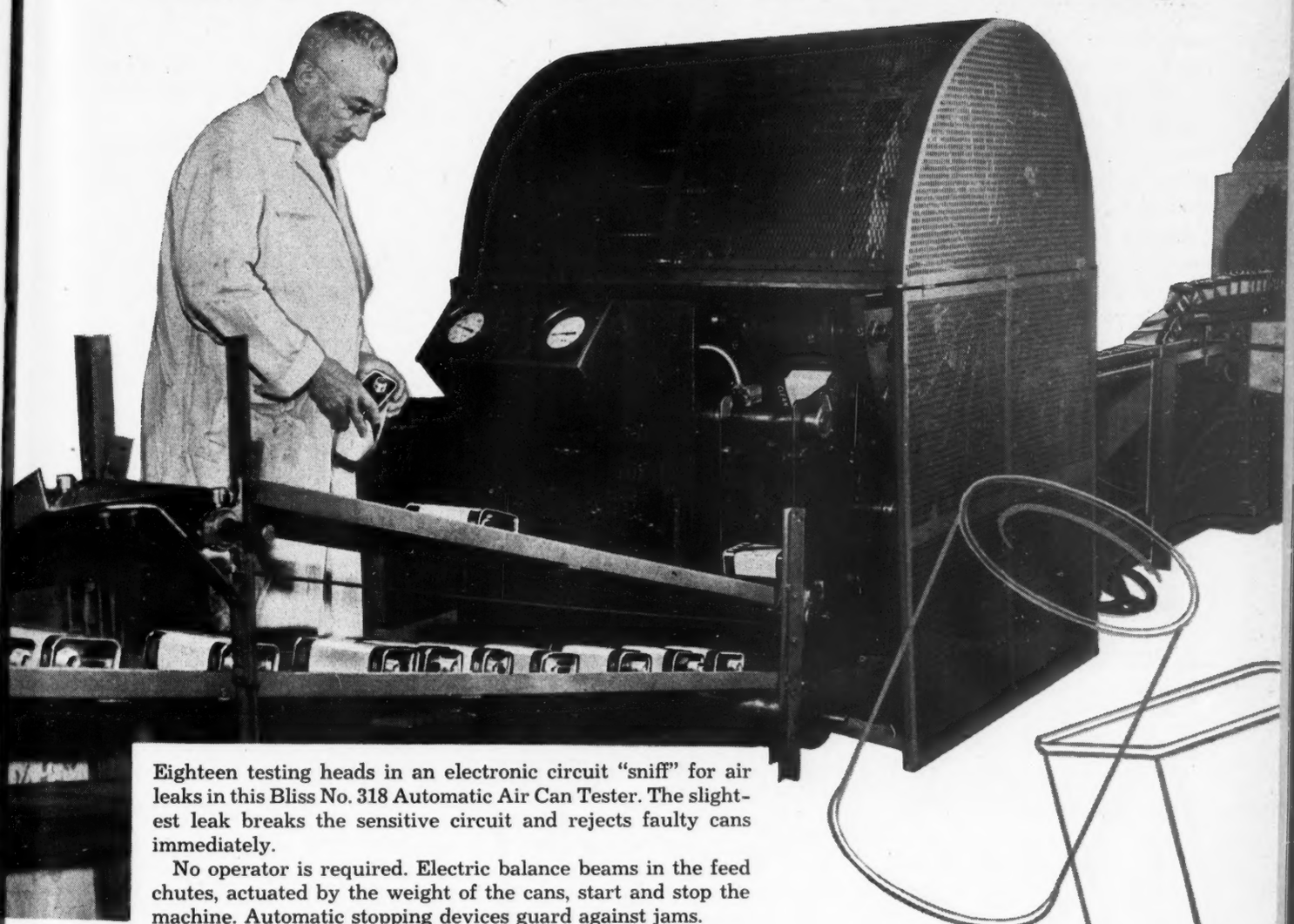

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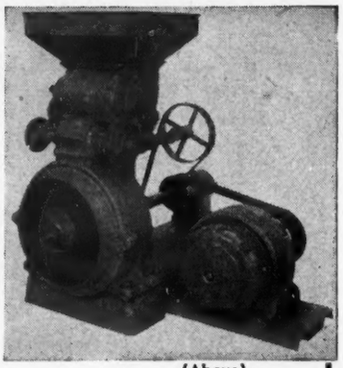
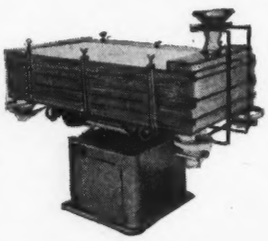
SCHUTZ-O'NEILL offers you the benefit of more than a half century of experience in rapid, accurate, dustless pulverizing of any dry, grindable, non-gritty stock. Send us a sample of any stock you need to pulverize, stating fineness desired. We will make a test grind, and give you a report on the best method to use and the type of Schutz-O'Neill Pulverizer and any receiving or sifting equipment suited to your requirements. Acceptance of this offer for a test grind does not obligate you.



(Above) Schutz-O'Neill Style "D" Pulverizer, for fine grinding of dry, non-gritty stocks. Made in 6 sizes with capacities up to 2000 lbs. per hour.

MILL PLANS FOR EVERY TYPE OF GRINDING

Schutz-O'Neill engineers, after they know your needs, can suggest a Mill Plan with the correct size and type of pulverizer, receiver box, expansion tubular collector or cyclone collector, gyrator sifter, etc.



(Left) The Schutz-O'Neill Gyrator Sifter turns out a large volume of uniform, clean product. 1 to 3 sieve frames for single or multiple separation.

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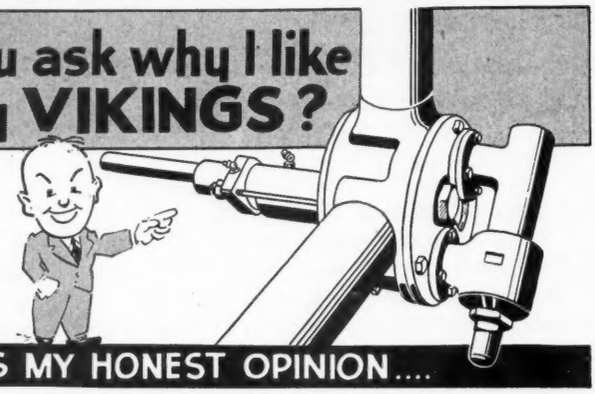

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treating from 0.5 to 2.0 percent of the original milk by the MIE process. Stabilization is more effective if the MIE-treated milk is added at the hot well before forewarming rather than later; and the treated portion can be used as fluid, concentrate, or powder with almost equal effectiveness. The process has only an insignificant effect on the calcium and ash content of the final product.

Digest from "The Utilization of the Mineral-ion Exchange Principle in Stabilizing Evaporated Milk," D. V. Josephson and C. B. Reeves, *Journal of Dairy Science*, vol. 30, 737-46, October, 1947.

PACKAGING

Insectproof Container

A COVERING for food packages, made of newsboard and paper and making the package substantially insect-proof, is disclosed in a recently issued patent. The food container is covered by a laminated structure with the center layer impregnated with dichlorodiphenyltrichloroethane and with adjacent layers of plain paper to retard evaporation.

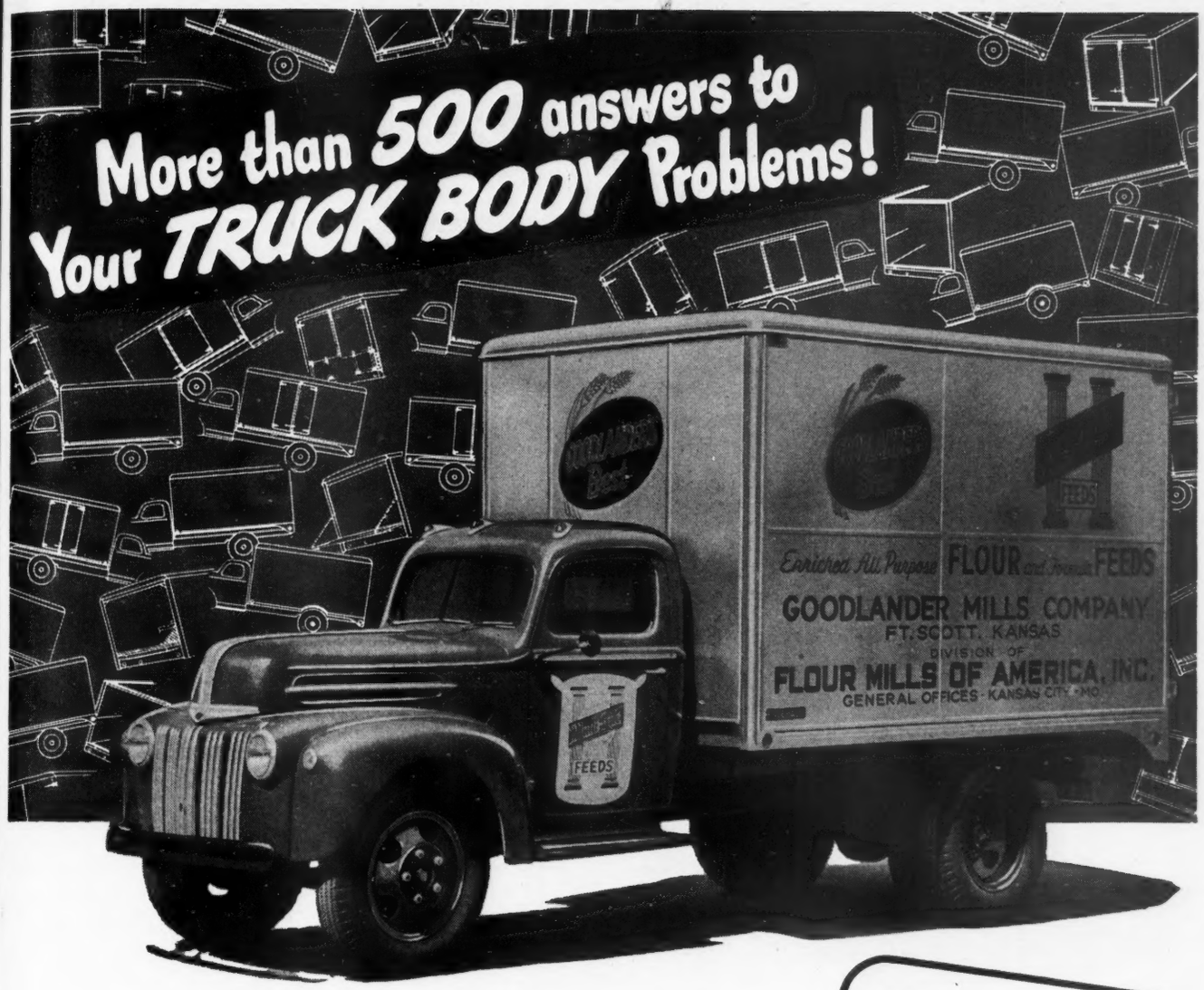
Digest from U. S. Patent 2,427,647 issued Sept. 16, 1947, on an application dated Dec. 30, 1944, to Hans W. Vahlteich, Edgewater, N. J., and assigned to The Best Foods, Inc., New York, N. Y.

MICROBIOLOGY

Import of Coliform Test

ALTHOUGH the coliform test for milk has long been used, its failure to receive wide adoption leaves a problem of vital concern to the dairy industry. No standard percentage positive level has been established and accepted, and there is a tendency to consider it impractical to require a low percentage of positive coliform tests. Hence an attempt has been made to see what percentages of coliform positives might be regarded as a tolerance level.

Samples from 14 plants were tested over a period of 4 months. Line run samples were also taken from those plants that showed intermittent high percentage positives, in an attempt to locate the source of contamination. Over the 4 month period, more than ½ the plants showed less than one percent positive coliform tests. A small number showed a high percentage, and a few ranged from the high to the low groups. Line run tests showed that unclean coolers and lines were sources of contamina-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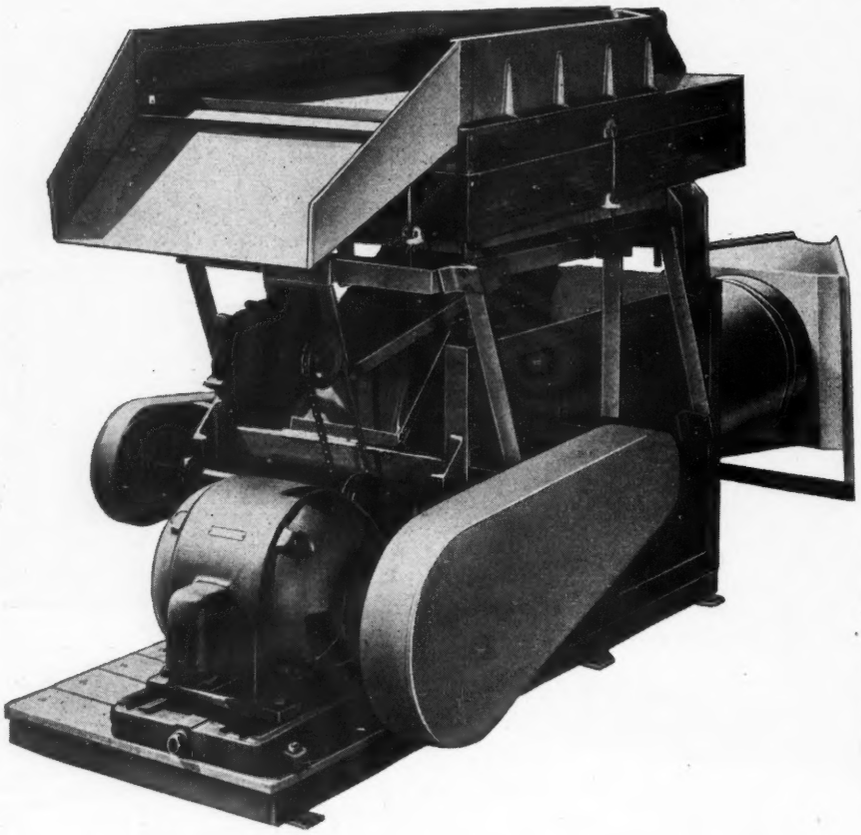

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tion, while bottle fillers and washers were free from that responsibility. The entire investigation indicates that well equipped plants can produce bottled milk showing less than one percent positive coliform tests. Although this can be set as a realizable goal, any attempt to establish a maximum level of less than 5-10 percent must be a gradual process.

Digest from "The Significance of the Coliform Test in Pasteurized Milk," by P. D. Delay, *Journal of Milk and Food Technology*, vol. 10, no. 5, 297-99, September-October, 1947.

ENGINEERING

Deaerating Liquid Foods

PROCESSING liquids, such as milk and fruit juices, by deaeration to preserve nutritive properties and prevent development of oxidized flavor, is the subject of a recent patent. This preheated milk is sprayed into the top of a deaerator chamber, the vacuum of which is high enough to flash-boil some of the water from the milk at its prevailing temperature. This process sweeps the air out of the milk, and the oxygen-free product which gathers at the bottom of the deaerator is thereafter kept out of contact with air while it is being further processed and delivered to a bottling station. From the deaerator a constant-speed pump forces the milk through a pasteurizer and maintains the fluid under sufficient super-atmospheric pressure to prevent air leakage into the system. The milk is cooled and delivered to a surge tank, where it is protected against reaeration by a float or other means, and thence to a bottle-filling reservoir that is under vacuum. Vitamin C is preserved, and oxidized flavor is prevented.

Digest from U. S. Patent 2,428,044, issued September 30, 1947, on an application dated April 9, 1942, to Paul F. Sharp, David B. Hand and Edward S. Guthrie, Ithaca, N. Y., and assigned to Cornell Research Foundation, Inc., Ithaca, N. Y.

Inspection of Bottled Beverages

IMPROVED apparatus has been patented for inspection of bottled beverages, to detect the presence of foreign particles in the fluid by means of a light beam directed through the fluid to a photoelectric cell. If a filled bottle is spun rapidly about its axis and its movement suddenly stopped, the fluid will continue to rotate. Any rotating particle in the fluid will affect the amount of light passing to the cell,

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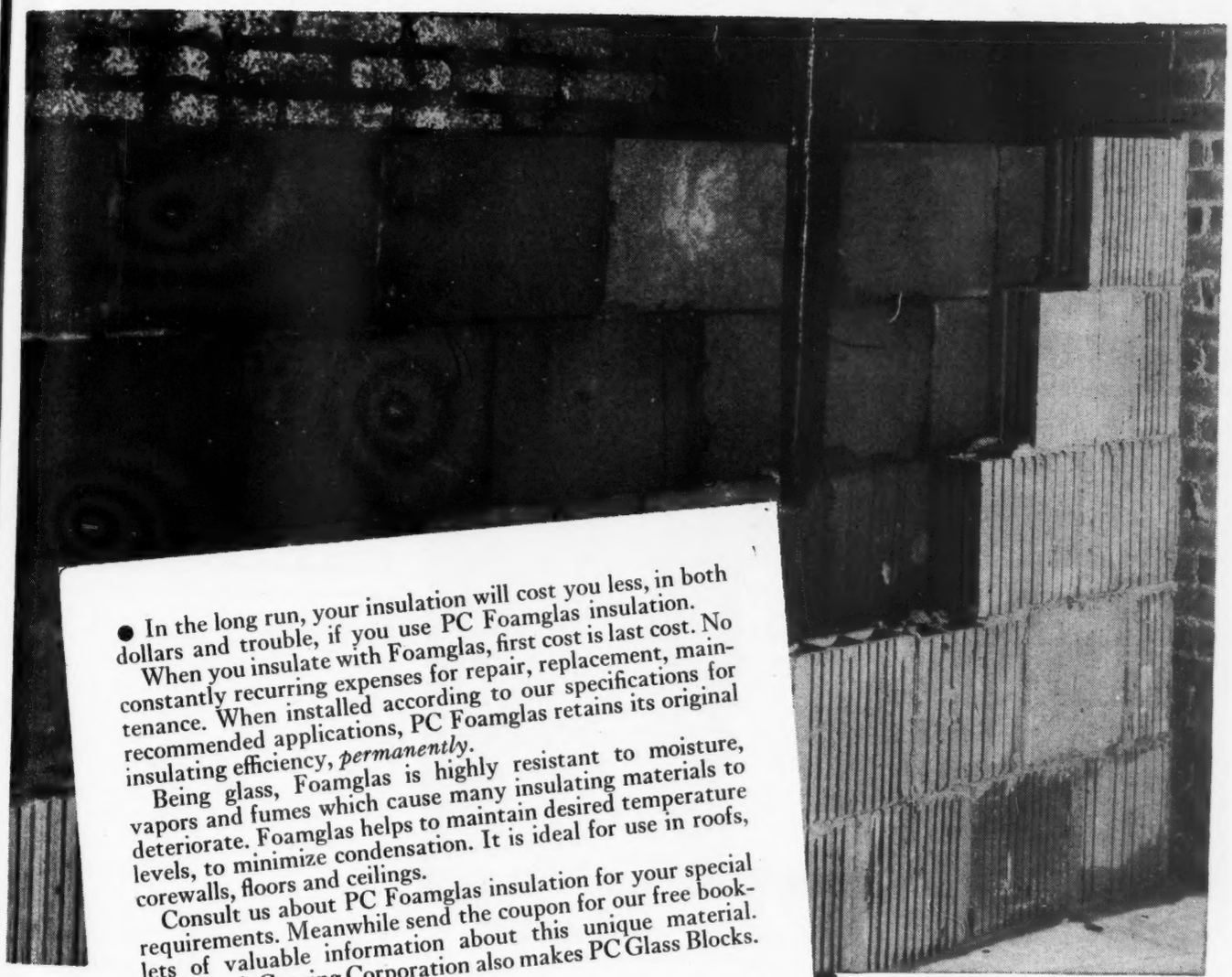

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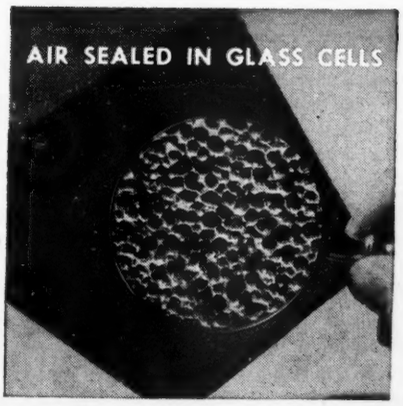

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and thus generate signals that can be amplified to actuate a rejecting mechanism. A large particle, however, will obstruct more light than a small one, and will generate a signal of greater amplitude. Hence it becomes necessary to provide sufficient amplification that a particle of the smallest size desired to be detected will be able to actuate the relays that control the reject mechanism. But high amplification also amplifies signals due to causes other than foreign particles in the beverage and causes undesired rejections. The purpose of the present invention is to provide apparatus that has constant sensitivity over a given range of particle sizes. This is achieved by so relating the degree of amplification to a band of pulse frequencies, corresponding to the range of particle sizes to be detected, that sensitivity is constant over that range.

Digest from U. S. Patent 2,427,319, issued September 9, 1947, on an application dated January 12, 1945, to Paul Weathers, Upper Darby, Pa., and assigned to Radio Corporation of America.

MISCELLANEOUS

DDT in Human Food

BUTTER made from milk of cows which have eaten forage treated with DDT may be a menace to human health. The cows transmit the insecticides to their milk where it is concentrated in the butterfat portion, so that a relatively small amount in the whole milk could possibly result in an injurious amount in the butter.

Ingested DDT accumulates in the tissues, especially in the fatty tissues, of animals. Since such staple foods as milk, butter, meat, lard and eggs are used in enormous quantities, the presence of small amounts of DDT in animal foods assumes the same importance as relatively larger amounts on fruits and vegetables consumed directly by man.

The level of DDT intake which shows histopathological lesions in animals is much below that which shows significant gross effect such as retardation of growth and hyperexcitability. In chronic rat experiments measurable storage of DDT in the fat results from 10 ppm. in the diet.

Digest from "The Use of DDT on Food Products," by O. G. Fitzhugh, Div. of Pharmacology, Food & Drug Administration, Wash. 25, D. C., presented before the Div. of Agr. & Food Chemistry, Amer. Chem. Soc., New York, N. Y., September 17, 1947.

BOOKS

Related Science

ANNUAL REVIEW OF MICROBIOLOGY, Vol. I. Edited by Charles E. Clifton in association with Sidney Raffel and H. Albert Barker. Published by Annual Reviews, Inc., Stanford, Calif., 1947. 404 pages; 6¼x9⅛ in.; cloth. Price, $6.

The bacteriologist in the food laboratory may find this first of its series interesting as a critical appraisal of the general field of microbiology. He will find little in this first volume, however, that has direct application to his immediate endeavors, as the topics are mainly of medical interest.

Fat Rancidity

A SURVEY OF PRESENT KNOWLEDGE, RESEARCHES AND PRACTICES IN THE UNITED STATES CONCERNING THE STABILIZATION OF FATS. By Walter O. Lundberg. Published by The Hormel Institute of the University of Minnesota, Austin, Minn., 1947. 45 pages; 6x9 in.; paper. Free.

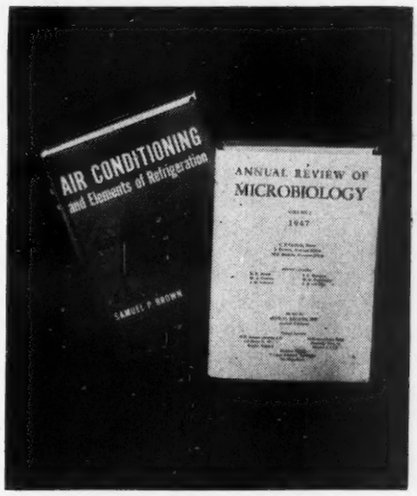
This booklet discusses in detail the prevention of oxidative rancidity in edible fats and fat-containing products by means of antioxidants. Because this subject involves so many aspects of food preservation, such as meat and fish products, bread spreads, shortenings, cereals, baked products and frozen foods, this short discussion should hold a widespread interest for most of the food industry.

Human Relations

THE MANAGEMENT LEADER'S MANUAL. Edited by James O. Rice and M. J. Dooher. Published by American Management Association, 330 W. 42nd St., New York 18, N. Y., 1947. 190 loose leaf pages; 6 x 8½ in.; treated paper. Price, $3.

One of the few bright spots in our turbulent postwar labor-management relations is the growing consciousness that there is a good deal of hoeing to be done on both sides of the fence. This book is made up of 22 articles prepared by top flight personnel executives, who discussed most of the phases of management's responsibility in human relations.

It is the first of a series to be published by the American Management Association on the improvement of individual and group relations in the nation's business structure. This presentation augurs well for those of the series that are to follow.



Refrigeration Engineering

AIR CONDITIONING AND ELEMENTS OF REFRIGERATION. By Samuel P. Brown. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y., 1947. 644 pages; 6¼x9¼ in.; cloth. Price, $6.

The food plant engineer, particularly if he deals with frozen products, should be interested in the refrigeration section of this book. Application of refrigeration principles and equipment selection, as well as the principles themselves, are discussed at some length. The book, however, manages to avoid complex theory and higher mathematics.

The reader is also shown how to calculate heating and cooling loads, and how to heat and cool and otherwise air condition any building. The tables, necessary for elemental design work, should prove convenient for those engaged in this branch of engineering.

Food Preservation

FOOD PRODUCTS. By Saul Blumenthal, Shirley Laboratories. Published by Chemical Publishing Co., Inc., 26 Court St., Brooklyn, N. Y., 1947. 986 pages, 6x8¾ in.; cloth. Price, $12.00.

One should not be misled by the title of this book. It is more than a compilation of formulas, reference tables and handbook information. Instead it is a record of accumulated practical experience for the food manufacturing executive, plant and laboratory chemist and technical salesman. The author has also included methods developed and used by other food specialists.

In addition to laboratory-developed and factory-tested formulas for milk products, beverages, con-

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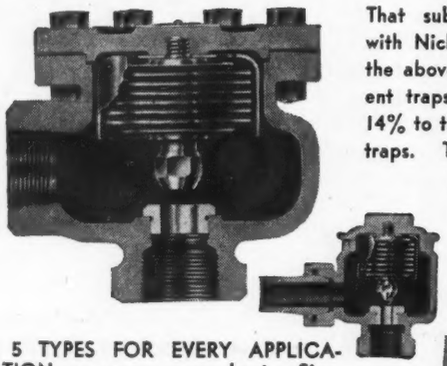
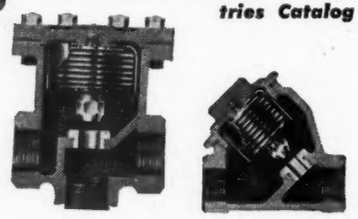
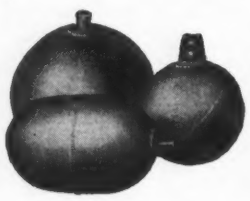


That substantial fuel savings are possible with Nicholson traps is again highlighted by the above mentioned test. For the 14 different traps on test, steam losses ranged from 14% to the record low of 1.04% for Nicholson traps. The test also confirmed their unequalled drainage capacity and proof against freezing.

Trap Bulletin 544 or Food Industries Catalog

5 TYPES FOR EVERY APPLICATION—process, power heat. Size ¼" to 2"; pressures to 225 lbs. Bulletin 544.





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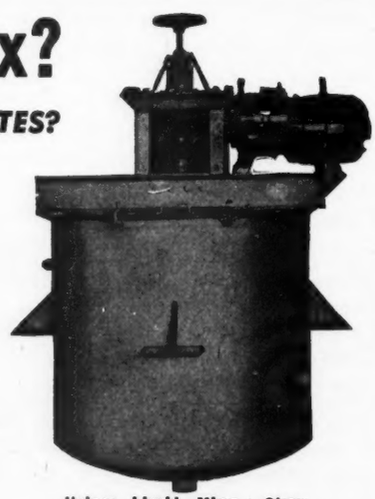

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fectionery, dessert powders and puddings, sauces and dressings, pies and pie fillings, cookies and cakes, flavors and sirups, jellies and preserves and health foods, a considerable portion of the book deals with basic food ingredients, preparation and processing of fruits and vegetables, fish and selection and preparation of raw materials.

One lengthy chapter is given over to the preservation of food by dehydration and freezing and another to plant sanitation and sanitary food control.

The author and publisher are to be complimented on their judicious selection of paper and type, which are conducive to easy reading of contents and pleasing appearance of the text pages.

GOVERNMENT PUBLICATIONS

The following recently issued documents are available, at the prices indicated, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. When no price is indicated the pamphlet is free and should be ordered from the Bureau responsible for its issue.

PRODUCTION OF MANUFACTURED DAIRY PRODUCTS, 1945. Bureau of Agricultural Economics. Processed.

BRIEF DIRECTIONS FOR THE MANUFACTURE OF LOW-ACID RENNET-TYPE COTTAGE CHEESE. By H. R. Lochry. Bureau of Dairy Industry, BDIM-Inf-50. Processed.

EFFECT OF DIFFERENT CONCEPTIONS OF MICRO-ORGANISMS ON THE FEEDING OF OYSTERS (*O. Virginica*). By V. L. Loosanoff and James B. Engle. Fish and Wildlife Service, Fishery Bulletin 42. Price 20 cents.

GLASS CONTAINERS FOR MARASCHINO CHERRIES (CAPACITIES, DIMENSIONS, AND PACKAGING). National Bureau of Standards, Simplified Practice Recommendation R197-46. Price 5 cents.

IMPROVEMENT AND INDUSTRIAL UTILIZATION OF SOYBEANS. U. S. Department of Agriculture, Miscellaneous Publication No. 623. Price 10 cents. Research summary of the Soybean Laboratory program.

ECOLOGICAL AND PHYSIOLOGICAL STUDIES OF THE EFFECT OF SULFATE PULP MILL WASTES ON OYSTERS IN THE YORK RIVER, VIRGINIA. By Paul S. Galtsoff, et al. Fish and Wildlife Service, Fishery Bulletin 43. Price 50 cents. Elaborate research report and summary of recommendations.

PATENTS

One-Pass Deneration of Milk Preserves Vitamin C Content, Removes Oxygen Gas and Retards Development of Off Flavor—P. F. Sharp, D. B. Hand and E. S. Guthrie to Cornell Research Foundation, Inc., Ithaca, N. Y. Nos. 2,428,044 and 2,428,045. Sept. 30, 1947.

Oil Bleached Under Vacuum by Spraying Downward With Adsorbent in Suspension Against Upward Flow of Steam—R. R. King, S. E. Pack and F. W. Wharton, Sherman, Tex., to Mrs. Tucker's Foods, Inc. No. 2,428,082. Sept. 30, 1947.

Wheat Germs Subjected to Infrared Radiation in Course of Milling Operations Without Altering Vitamin or Mineral Content Preparatory to Reintroduction into Milling System — P. Naeher, Evanston, and M. T. Williams, Oak Park, Ill., to B. F. Gump Co. No. 2,428,090. Sept. 30, 1947.

Eggs Given Immersion Bath Treatment—W. G. Howard, Indianapolis, Ind. No. 2,428,115. Sept. 30, 1947.

Citrus Fruit Mechanically Halved and Reamed for Juice Extraction—M. G. Healy, Montebello, Calif. No. 2,428,157. Sept. 30, 1947.

Sausages Coated by Dipping in Mixture of Gelatin, Calcium Carbonate and Water at 125 Deg. F.—J. N. Lesparre and R. E. Carlson to Armour & Co., Chicago, Ill. No. 2,428,495. Oct. 7, 1947.

Fruit Concentrate Made Readily Dispersible by Water-Soluble Salt of Amylopectin Glycolate—Ramon Perech, New York, N. Y. No. 2,428,636. Oct. 7, 1947.

Cereal Particles Colored by Heat-Fixing of Edible Pigment—C. G. Harrel and R. O. Brown to Pillsbury Mills, Inc., Minneapolis, Minn. No. 2,428,665. Oct. 7, 1947.

Liquids Quick-Frozen by Direct Contact with Surface of Rotatable Refrigerant-Containing Freezing Drum—L. J. Casmire, Los Angeles, Calif. No. 2,428,736. Oct. 7, 1947.

Vegetable Pigments Obtained by Extracting With Organic Solvent and Passing Solution Over Bone Meal—T. B. Mann, Upton, Wirral, England. No. 2,428,740. Oct. 7, 1947.

Yeast Propagated and Glycerine Synthesized by Yeast Fermentation of Carbohydrates—A. L. Schade to The Overly Biochemical Research Foundation, Inc., New York, N. Y. No. 2,428,766. Oct. 7, 1947.

Cocoa Beans Moistened and Roasted in Continuous Manner by Current of Hot Gasses—Wallace T. Jones, New York, and Benjamin J. Zenlea, Ozone Park, N. Y., to Rockwood & Co., Brooklyn, N. Y. No. 2,428,802. Oct. 14, 1947.

Bananas Mechanically Coated to Prolong Marketability—Robert O. Hockman and Walter C. Reiman, Cincinnati, Ohio, to The Kroger Grocery & Baking Co., Hamilton County, Ohio. No. 2,429,130. Oct. 14, 1947.

Food Juices Extracted by Worm Screw Type Press—Irving Eastman, New York, N. Y. No. 2,428,869. Oct. 14, 1947.

Cookie Dough Deposited by Action of Reciprocating Plunger—Bernard Bader, Seattle, Wash. No. 2,429,042. Oct. 14, 1947.

Fruit-Flavored Sugar Made Into Nonhygroscopic Bricks—Alexander M. Zenzes, New York, N. Y. No. 2,429,251. Oct. 21, 1947.

Peanuts Cleaned by Air Separation and Sifting—Henry M. Carter, Charlie F. Carter and William W. Carter, Brundige, Ala. No. 2,429,343. Oct. 21, 1947.

Sucker-Type Frozen Confection Formed in Container Lined With Moisture-Resisting Edible Material and With Compartments Made by Edible Partitions—Harvey C. Gibson, Sr., Lancaster, Pa. No. 2,429,353. Oct. 21, 1947.

Deep-Fat Frying Controlled by Heat Exchange Units Designed to Have Diminishing Cross Sectional Areas From Inlet to Exhaust Ends—Edward L. Kells, Alhambra, Calif. No. 2,429,360. Oct. 21, 1947.

Fruit Mechanically Graded During Passage Through and Over Adjustable Apertures—Emerson Metzger, Berrien Springs, Mich. No. 2,429,560. Oct. 21, 1947.

Protein-Polyphosphate Product Made From Vegetable Protein-Containing Material—Artemy A. Horvath, to Hall Laboratories, Inc., Pittsburgh, Pa. No. 2,429,579. Oct. 21, 1947.

Poultry Mechanically Plucked by Rotating Elastic Finger-Like Members Alternately Spaced With Disks—Gordon W. Johnson, Raytown, Mo., to Gordon Johnson Co., Kansas City, Mo. No. 2,429,628. Oct. 28, 1947.

Jelly Base Made to Have Pectinized Sugar Composition—Alexander M. Zenzes, New York, N. Y. No. 2,429,660. Oct. 28, 1947.

Chewing Gum Made to Consist of Gum Base and Amide of Fatty Acid With at Least 8 Carbon Atoms—Harry Bennett, New York, N. Y. No. 2,429,664. Oct. 28, 1947.

Amino Acids Selectively Separated by Percolating Through Bed of Porous Granular Sulphonic Phenol Aldehyde Resin—Richard J. Block, Scarsdale, N. Y., to C. M. Armstrong, Inc. No. 2,429,666. Oct. 28, 1947.

Pears Mechanically Pared, Cored and Halved in Single Unit—Guy A. Dunn, Oakland, Calif., to California Packing Corp., San Francisco, Calif. No. 2,429,749. Oct. 28, 1947.

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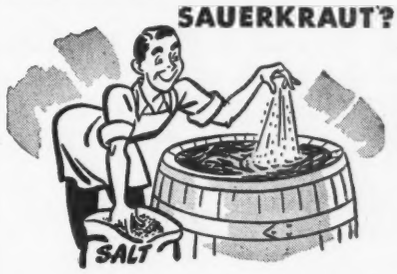
Bulls are color-blind. Scientists have disproved the theory that they "see red." Famous matadors agree that when "El Toro" blows his top at sight of a waving red cape, it's the waving . . . not the red . . . that riles him.

COARSE SALT FOR SAUERKRAUT?



Another popular misconception is the belief among some makers of sauerkraut that they must use the very coarsest crystals of salt. Scientists *know* that light, bulky salt (such as Diamond Crystal's grain for the purpose) spreads more easily in the vat. This results in uniform salt distribution and much better control of sauerkraut fermentation.

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DIAMOND CRYSTAL Alberger PROCESS SALT

Cheese Development

(*Continued from page* 99)

for shipment overseas. The method can be modified for use in preparing so-called "grated" cheese, which may be made drier and with somewhat more fat than that now available.

Packaging Cheese

Canned Cheese. The first successful method of packing and curing natural Cheddar cheese in consumer-size units resulted from the invention, by L. A. Rogers of these laboratories, in 1931-33, of a can vented with a one-way valve. While it has the disadvantage that the cheese is not visible, it proved to be a convenient package for curing, dispensing and using cheese. It provides complete protection against mold and other contamination. The valve-vented can has had considerable use, mostly in the Western states. Its successful use served to call attention to the possibilities of packaging natural cheese, and served to demonstrate to manufacturers the feasibility of consumer-size units and the requirements for ripening cheese in packages.

Curd Pressed

The cheese curd is pressed in a special form of the size and shape of the can, either round or rectangular, and is inserted into the can, which is then sealed. During curing in the can, the one-way valve permits the escape of the carbon dioxide gas that forms, and thus prevents bulging of the can. Furthermore, it prevents the entrance of air, and thus prevents mold growth.

The Experiment Station at Geneva, New York, sealed the pressed cheese curd in cans under vacuum. Similar research has been conducted at the Washington State Agricultural Experiment Station. This vacuum-canning method was proposed for use with cheese made from very high grade pasteurized milk, the vacuum being sufficient to prevent the cans from being bulged by the gas formed during ripening. Workers at Cornell University have more recently proposed a method involving the insertion of a gas-absorbing chemical in the can with the cheese, to absorb the gas that forms and thus prevent swelling of the can.

Natural Cheese in Transparent Wrappers. The packaging of natural cheese is more complicated and not so far advanced as that of process cheese. It is necessary to press the curd, before packaging, in a rectangular shape if it is to be sold in the loaf style, or in small hoops, the shape of the container, if it is to be canned. Hoops and cutters for this purpose are on the market.

The types of wrappers used on most solid foods are not suitable for cheese, because of the moisture, fat, and acid present and the susceptibility of cheese to mold spoilage. The requirements include: Cheese surface clean and particularly free of mold contamination; an extremely close wrap without air pockets; retention of moisture and fat; edges sealed to prevent access of molds; absence of flavors in the wrapper; wrapper not affected chemically by the cheese; pleasing appearance and low cost.

Rindless Loaf

For rindless loaf cheese, consumer-size prints of the pressed curd are wrapped and re-pressed lightly for curing with the wrapper on; or the pressed curd may be wrapped and re-pressed lightly before curing and, after curing, cut and re-wrapped for sale, in units weighing from ½ to 5 lb. A few manufacturers blend and grind the cured cheese and force it into casings of viscose or cellulose, forming sausage-shaped units. This product may be smoked, and wax may be applied over the wrapper.

Recently considerable progress has been made in the development and use of materials for wrapping and packaging rindless natural cheese. These include the heat-sealing pliofilm-type wrapper and the heat-sealing, wax-coated cellophane-type wrapper used for process cheese, and also flexible, microcrystalline wax, applied hot. The wax is obtainable in attractive colors, and the waxed product may be wrapped in cellophane, metal foil, or parchment. Tests are being made commercially of the use of a pliofilm-type wrapper in which the pressed cheese loaf is heat-sealed under vacuum to exclude air, and is ripened in the package; also of the use of transparent wrappers which are treated to retard mold growth and used for wrapping prints or cured cheese.

Numerous other types of packaging for natural cheese are being tried out, and several manufacturers are successfully marketing natural cheese in consumer-size loaves, of various shapes, in durable, transparent wrappers.

Packaging and merchandising natural, rindless cheese in cans or in attractive, sanitary wrappers—preferably transparent—permits the cheese to ripen normally and eliminates all the waste of loss of moisture, growth of mold, formation of rind, expense of cleaning and paraffining in the curing room, and crumbling during cutting; and prevents insect and other contamination. Developments in packaging are progressing rapidly and, to the extent that the researchers can solve the difficulties peculiar to cheese, they will greatly increase the use of natural cheese.

Packaging Process Cheese. Methods for packaging process cheese have been developed to the stage where the keeping quality of the product, which is one of the most important considerations, is very satisfactory.

Process cheese and some cheese spreads flow into the containers while hot, following blending and pasteurization. The heat destroys nearly all of the bacteria and molds so that the product keeps very well, and also seals the package.

Metal foils are superior to other types of flexible wrappers, and tin foil is better than aluminum foil, according to experiments made at the Wisconsin Agricultural Experiment Station. Metal foils were unobtainable during the war, and transparent wrappers are used extensively. They have the important marketing advantage that the cheese is visible.

A transparent cellophane-type wrapper, coated with microcrystalline wax and sometimes made in two laminated layers, is used on large quantities of process cheese. A transparent pliofilm-type wrapper, unavailable during the war, is now on the market and offers great promise. It is durable and is claimed to have the advantage that it permits the escape of carbon dioxide, but it is relatively resistant to the passage of air and, therefore, protects the product very well against the growth of mold.

The use of glass jars with sealed metal lids, for soft types of process cheese and some cheese spreads, has been developed successfully by several firms.

Further Research Needed

The methods of manufacture of various types of cheese resulted largely from chance observations. The process in each case was looked upon as an art and in most instances was kept a secret to as great an extent as possible.

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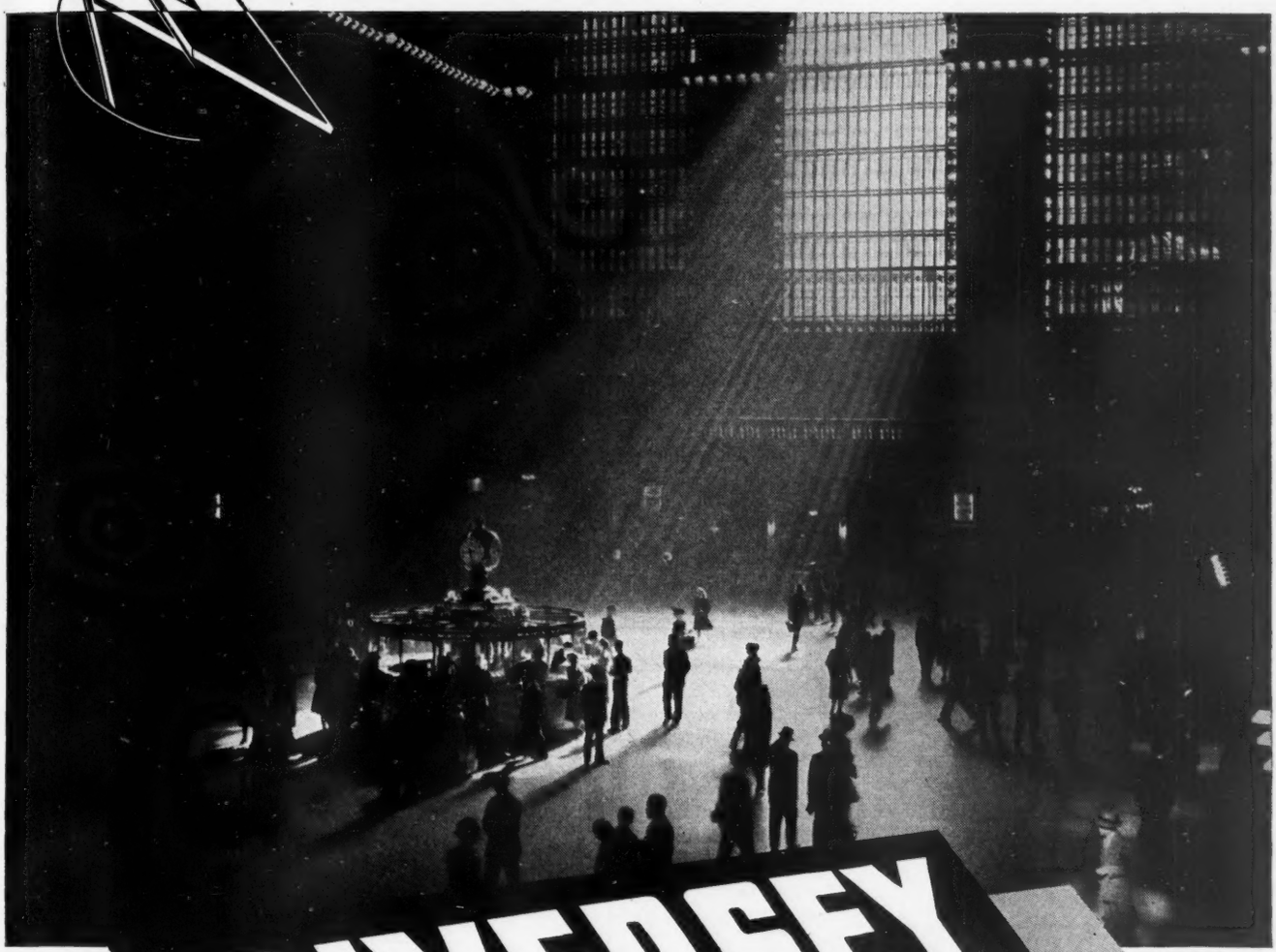

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As the knowledge of bacteriology and chemistry has advanced, the types of fermentations involved have been determined in many instances, and the use of pasteurized milk and pure cultures has made possible the application of precise controls in the manufacturing processes. Thus, cheesemaking is becoming a science rather than an art.

The foregoing descriptions and discussion indicate to some extent the progress that has been made. While scientific methods are now employed in the manufacture of several varieties, there is still little knowledge of a fundamental nature concerning the manufacture of a number of the other popular varieties.

There is need for the study of the underlying principles in the manufacture of foreign type cheese, especially Swiss and the Italian varieties, from pasteurized milk. Information is also needed concerning the role of different enzymes in the various curing processes, the utilization of whey protein in making cheese, and the packaging and curing of cheese in consumer size containers.

As the cheese industry continues to develop, and as the demands for better quality and for greater efficiency in production increase, scientific methods will play an increasingly greater role.

—End—

Glassed Carrots

(*Continued from page* 115)

jars with low vacuums, also significantly improved the color of the product throughout the jar. These tests demonstrated that oxidative discoloration normally takes place throughout the jar and is not limited to the upper portion where the oxygen concentration is greatest.

Preventive Means

Tests of the theory that oxidation causes zonal discoloration have indicated a way to prevent it. Controlling the vacuum at 20 in. prevents the development of the dark zone at the top portion of the jars. The use of anti-oxidants, such as the ascorbic acids, can neutralize the effects of vacuums as low as 10 in. from the standpoint of zonal discoloration and can also improve the color of the product throughout the jar.

Means of preventing the diffused discoloration associated with high reducing sugar concentrations were not ascertained. Presumably, elimination of this type of discoloration can be effected by controlling the reducing sugar content in the raw material. A study of the effect of storage temperature on the starch-reducing sugar balance in raw carrots may indicate the basic preventive measures.

In the meantime, however, the significance of this type of discoloration can be minimized by preventing the occurrence of oxidative discoloration along with it. When diffused discoloration is uniform throughout the jar without a darkened top zone, the overall impression is not entirely adverse, but variation in color from jar to jar, due to the variable amount of reducing sugar contained, suggests poor manufacturing control.

References

Heinrich Hasselbring, Carbohydrate Transformation in Carrots During Storage, *Plant Physiology*, 2, no. 3, 225-243, 1927.
C. O. Appleman and C. L. Smith, Effect of Previous Cold Storage on the Respiration of Vegetables at Higher Temperatures, *Journal of Agricultural Research*, 53, no. 8, 557-580, 1936.

—End—

Bottlers Convention

(*Continued from page* 75)

Mr. Ellner presented, with the aid of lantern slides, a number of applications of "Violet Ray Treatments of Water and Sirup." He explained the use of germicidal lamps in controlling molds and yeasts in liquid sugar storage tanks, in sterilizing water and reducing air-borne bacteria in bottling rooms.

Public Relations

Arthur H. Motley, president Parade Publications, New York, and Thomas G. Spates, vice-president, General Foods Corporation, were the principal speakers at the second general session.

Mr. Motley's address was on the subject "How Well Are We Minding Our Own Business?" He stated that we are "looking for the customary whipping boy" instead of making an honest attempt to do something about price inflation. A substantial reduction in government expenses should be made, he said.

Labor, according to Mr. Motley, has concerned itself with everything except its primary function, increased production. Labor says that the retailer is profiteering, the wholesaler is gouging. Mr. Motley said these, and other claims, are nothing more than attempts to conceal the fact that labor's productivity per man hour has not increased as it could and should.

Citing numerous examples of the lack of consideration being shown the consuming public, Mr. Motley predicted a shift from a seller's to a buyer's market. This will necessitate a complete re-education of all sales forces.

Mr. Spates, speaking on "The Trend in Labor Legislation," advocated providing other than financial incentives for men who work. He believes that the question "How Am I Doing?" should be answered directly to each employee at least once a year. Human relations, he stated, should not be turned over to labor lawyers but should be settled directly between employer and employee.

The 1947 A.B.C.B. Medal was awarded at this session to Mr. Thomas Moore, Minneapolis, Minn., for outstanding service and contribution to the advancement of the bottled carbonated beverage industry. Presentation was made by Fred S. Gould, Atlanta, Ga.

The Wednesday afternoon special meeting was opened by Katherine Wellingbrook, Public Relations Council, New York, who spoke on the subject "You Have A Public Relations Job To Do."

Milton A. Smith, Chamber of Commerce of the United States, discussed the Labor-Management Act of 1947.

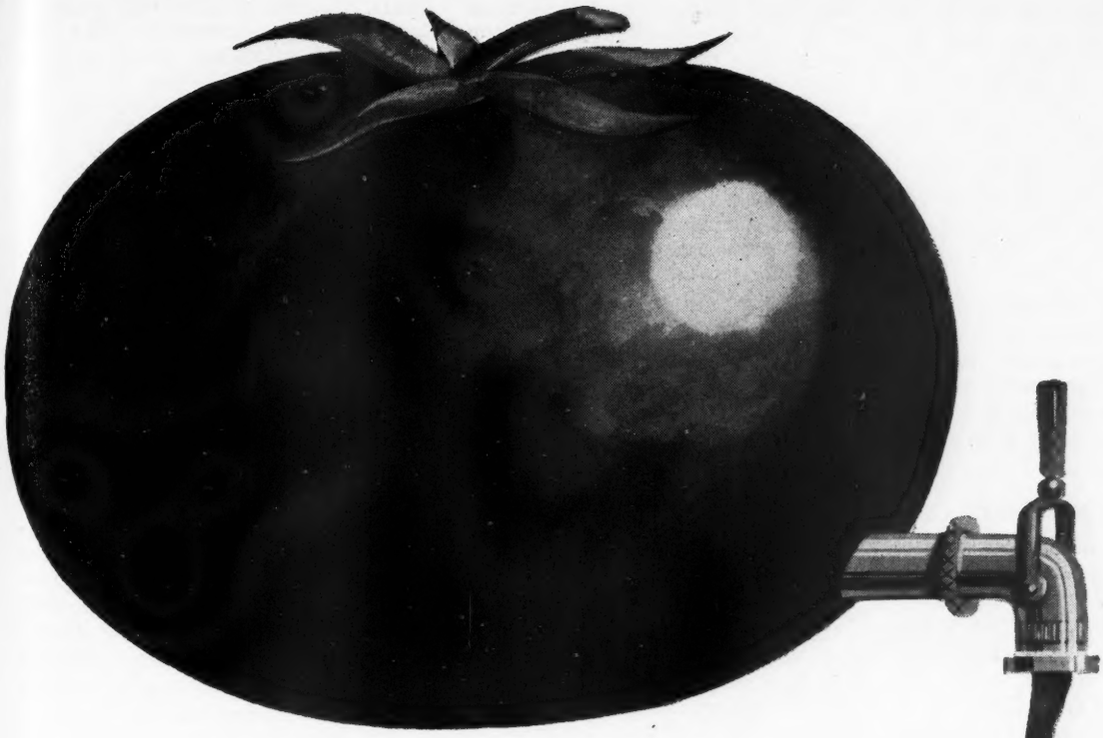
A panel discussion followed on "What is the Bottler's Sales Problem, and What Can He Do To Meet It?" Panel members were: T. H. Stanley, sales manager, Nehi Corp., Columbus, Ga.; T. Gordon Mason, sales manager, Dr. Pepper Co., Dallas, Tex.; Ben H. Wells, sales manager, Seven-Up Co., St. Louis, Mo., and Edward W. Mehren, president, The Squirt Co., Beverly Hills, Calif.

Merchandising

Dilman M. K. Smith, vice-president of Opinion Research Corp., Princeton, N. J., was the opening speaker at Thursday morning's general session. "Average weekly earnings," declared Mr. Smith, "are up far out of proportion to cost of living, despite labor union and farm organization propaganda to the contrary."

He urged the bottlers to use the same skill, persuasiveness and persistency in selling themselves, their purposes, their motive and the economic facts of life to their employees as they do in selling their products to the public.

"Unless you do these things," he



Maybe there's a point here about profits for you

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added, "your competition for workers' allegiance—politicians and labor leaders—will continue to trade on the misinformation and ignorance of your people, and you will not achieve labor harmony."

"Merchandise Must Move," was the subject of a talk by Rilea W. Doe, vice-president, Safeway Stores, Inc., Oakland, Calif. He declared that bureaucratic controls not only hurt the business against which they are aimed, but are a boomerang restricting the freedom of all business. The secret of selling merchandise, according to Mr. Doe, is finding out what Mrs. Jones and Mrs. Brown want.

Employee Relations

The Thursday afternoon special meeting was opened with a talk by Eugene J. Benge, president, Benge Associates, Chicago, on "As I See the Bottler's Employee Relations Problem." Mr. Benge, who has worked with the A.B.C.B. on a number of industry-wide personnel problems, discussed the need for: (1) A better source of labor supply; (2) better training for driver-salesmen; (3) incentives, both financial and non-financial — the non-financial incentives would give employees stimulus through participation, recognition, competition and similar devices; (4) further study of supervisors and supervision; (5) research into union relations, and (6) strengthening of employee morale.

Mr. Benge's talk was followed by a panel discussion "Where Are We Heading in Labor Relations?" Panel members were: Edward Wagner, W. T. Wagner Sons Co., Cincinnati; A. G. Beaman, Seven-Up Bottling Co., Nashville; Henry Browne, Oklahoma Coca-Cola Bottling Co., Oklahoma City; Timothy P. Sheehan, Silver Brook Bottling Co., Chicago, and Morris Kirsch, Kirsch's Beverages, Brooklyn.

—End—

Packaging Institute

(*Continued from page* 110)

will soon be coming out with Cry-O-Vac made of a synthetic material having the desirable features of the former pure rubber Cry-O-Vac.

6. Dow Chemical Co. has been developing their Saran film No. 517 for packaging natural cheese, bottle cap liners and laminated structures.

7. The Mil-O-Seal packaging procedure for meats, using Pliofilm, is also finding application in the cheese, citrus fruit and vegetable fields.

8. The R. A. Jones Co., Cincinnati, Ohio, has a Constant Motion Cartoner which is automatically opening cartons, loading and closing cartons and imprinting them at higher speeds than before.

9. The Miller Wrapping and Sealing Machine Co. of Chicago has a new Corley Band Label Dispenser that takes printed gummed tape in rolls and measures, moistens and cuts them to proper length, automatically, for application as required.

Hot Melt Compound

10. A new hot melt compound, Verecote No. 307, has been developed by the Plastics Div. of Monsanto Chemical Co. as a heat sealing coating for all types of papers. It can also be used on paper for thermoplastic labels.

11. Using thermoplastic labels, a high-speed label machine has been developed by the New Jersey Machine Corp. of Hoboken to operate at a speed of 300 per min.

12. The Ohio Boxboard Co. of Rittman, Ohio, has developed Farm Pak Baskets, Apple Cartons and Berry Containers that can be shipped knocked-down and then set up without gluing, taping, or stitching.

13. Paisley Products, Inc. of Chicago has developed their Flatack Non-Warp Glue for the set up box industry, using speeded-up automatic machines. Another development is the Icestick Bottle Label Glue No. 3643 for beer and other bottled goods subjected to long water immersions.

14. Corroflex Tube Tainer, a new flexible corrugated cushion packaging material, is furnished as a ready-made container in roll form by Sherman Paper Products of Newton Upper Falls, Mass.

Wrapping Odd Shapes

15. Stokes and Smith Co. of Philadelphia has a new Stretch-Paker for wrapping odd shaped objects in a vacuum with heat sealing Pliofilm. Their High Speed Neverstop Carton Filling and Sealing Machine, used by a large soap manufacturer, is now offered to others. Entirely automatic, it is capable of handling, filling, and sealing at speeds of 160 or more per min.

Laminated Wood Pallets

16. L. T. Swallow and Assoc. of Detroit offer laminated wood veneer pallet trays and containers which are light-weight and durable.

17. Union Paste Co., Hyde Park, Mass., has developed a resin emulsion, M-192 Adhesive, which is used for adhering cellulose acetates, cellophanes and Pliofilm to paper or paperboard.

Their M-39 Adhesive is an extremely fast resin emulsion with latex added. It is suitable for films and foil combinations.

A product of their war development, No. B-719 Lacquer Adhesive, is used in attaching labels to wood, tin or glass.

18. The Waxide Paper Co. of St. Louis, Mo., has a Mullinex package that is being successfully used for bacon and sausages. It is a laminated paper construction that offers opacity, greaseproofness, protection against moisture losses and flavor and color changes due to light. It is also easily reclosable.

Work of Committees

First on the program for the Technical Committee was a discussion on the 11 test method procedures, under the leadership of E. L. Hobson, Monsanto Chemical Co.

Since suppliers and users of packaging materials have been using their own test methods, the committee has been working with other test method organizations like TAPPI and ASTM to standardize paper testing methods for members of the institute. The 11 test methods which have been promulgated will be circulated to members for comments. They may then be drawn up in the form of proposed, tentative and standard methods.

The committee, through the cooperation of Packaging Machinery Institute, is undertaking a compilation of packaging machinery characteristics. It will include: (1) Manufacturer, (2) function, (3) speed, (4) floor space area requirements, (5) horsepower, (6) package sizes handled and (7) a list of materials that can be handled by the machine.

Definitions for films, foils and sheets and progress on the preparation of a glossary for packaging terms took up the Standards and Practices Committee program under the chairmanship of H. T. Holbrook, Flex-Vac Div., Standard Cap and Seal Corp.

Other projects proposed were a systematic study of methods of preventing insect infestation in package goods and an official toxicity rating for materials in contact with foods.

A. B. Brackett, packaging engineer, Birds Eye-Snider Div., General Foods Corp., acted as chairman of the seminar on foods, candy and tobacco.

Growth of packaged goods at the expense of bulk goods was reported by E. A. Throckmorton, president, Container Laboratories, Inc. For example during 1927 to 1944, bulk candy sales declined 23.6 percent. Packaged candy sales, on the other hand, increased 157.6 percent during the same period. He also said that those firms who pioneered in food packaging have grown rapidly, and the sale of packaged foods will continue to increase over the sale of bulk goods.

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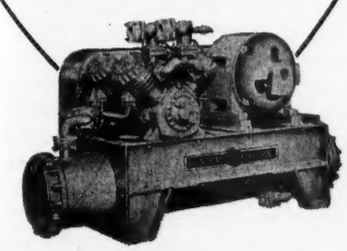

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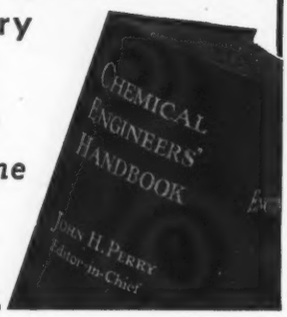

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C. Olin Ball, consulting food technologist, told of the merits of solid versus flexible containers. Solid containers are generally recognized as superior to flexible containers because of: (1) Functional ability of the container to protect the contents in storage, (2) resistance to external physical injury, (3) resistance to chemical or physical action of the product and (4) adaptability to mechanized handling. Flexible containers, however, cost less delivered to the packing plant and occupy less space and storage requirements in the packing plant and in distribution.

The practice at present is to use rigid containers exclusively for sterilized foods and liquid foods. Flexible containers are almost exclusively used for pasteurized solid foods, dehydrated foods and fresh fruits and vegetables. Both types of containers are widely used for frozen foods and candy.

—End—

Retention of Vitamins

(*Continued from page* 85)

more familiar pack mainly in the brining and closing operations. However, the rate of heating in vacuum packed products is retarded when the temperature of the product approaches retort temperatures, thus requiring a somewhat longer time for processing vacuum packed foods than is required for the same product packed in brine. In order to accelerate the heating of vacuum packed vegetables, an agitating process was developed in these laboratories by Roberts and Sognefest[5]. Agitation of the can during heating makes it possible to decrease markedly the processing time without lowering the sterilizing value of the process. Briefly stated, the agitated process differs from the conventional still processing by providing agitation of the sealed cans during thermal processing.

Vacuum Packed Corn

This new agitating process was studied with respect to vitamin retention in whole kernel white corn. Two separate uniform batches of white corn were used in these studies. From each batch of raw stock, 11.5 oz. of corn and 1.5 oz. of salt-sugar brine were added to each 307x306 can. After closing under a 27-in. vacuum, the cans were divided into two lots, one of which was heat processed 12 min. at 250 deg. F. with the cans being rotated end-over-end; the other cans were processed the conventional 35 min. at 250 deg. F. in a still retort. Also, from each batch of raw stock, 51 oz. of corn and 5.0 oz. of a salt-sugar brine were weighed into 603 x408 cans and the cans were closed under a 27-in. vacuum. The cans were divided into two lots, one of which was processed 17 min. at 250 deg. F. while the cans were being rotated end-over-end; the other cans were processed 60 min. at 250 deg. F. in the conventional manner. In both size cans, the calculated sterilizing values (F_o) of the two types of heat processes were identical.

Samples were taken from each of the two separate batches of raw corn for thiamine and niacin determination by blending equal weights of raw product and 0.2N H_2SO_4. The liquid and solid portions of each of six cans were separated and composited for the vitamin determination. The slurries for thiamine and niacin determinations were made by the methods previously described.

Vitamins in Solution

The thiamine and niacin contents of the raw corn and of the solid and liquid portions of the canned product are summarized in Table III. These data show that significant quantities of thiamine and niacin passed into the liquid portion in the can. Because of the small amount of liquid in vacuum packed products, this does not represent a loss of the vitamins, since the brine can be more readily utilized in preparing the corn for serving.

The retention of niacin in solids plus liquid was approximately 100 percent for samples in either can size processed by either agitating or conventional processing methods.

In Chart I, the average percentage retention of niacin is graphically summarized.

The data in Table III and the graphic summary in Chart II illustrate the definite superiority of the agitating process with respect to thiamine retention. On the basis of total thiamine per can (solids plus liquid) agitated processed samples contained 30 to 60 percent more thiamine than control samples processed by the conventional technic. Because of the heat-labile characteristic of thiamine and the less severe heat treatment, the product processed in the 307 x 306 cans retained more thiamine than that canned in the 603 x 408 cans. In addition to better thiamine retention, vacuum packed white corn processed by the agitating technic was better in color and flavor than

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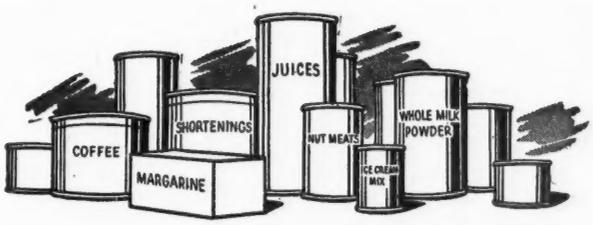

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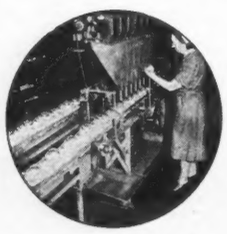

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the conventionally processed samples.

Summary

The influence of processing technics on vitamin retention in low-acid foods has been discussed and the effect of two new processing technics, the "high-short" and agitating methods, on thiamine and niacin retention in vegetable products of varied types is presented.

Excessive heat treatment, which is received by the portion of conduction-heating products near the can wall during commercial sterilization by conventional methods, is responsible for a considerable sacrifice of thiamine during this operation. Under conditions which permit rapid heating of the entire mass of the food, thermal processing to equivalent or greater sterilization (F_o) values at temperatures of 270 to 300 deg. F. is more favorable to thiamine retention than processing in the range of 240 to 260 deg. F. and minimizes changes in quality factors as well. After processing by the "high-short" technic, the semi-solid vegetable products studied retained 78 to 98 percent of the thiamine in the product prior to processing. Control samples processed by conventional methods retained 32 to 79 percent of the thiamine.

The agitated process presents a solution by mechanical means of the problem of increasing heat transfer in many vacuum packed vegetables. Samples of white corn processed by this method contained 30 to 60 percent more thiamine than control samples processed in the conventional manner and were also greatly superior in color and flavor to the control.

Niacin retentions were consistently high in foods processed by either "high-short," agitating or conventional methods.

References

1. The Canned Food Reference Manual, American Can Company, New York, N. Y., 1943.
2a. J. R. Wagner, F. M. Strong and C. A. Elvehjem, Effect of Commercial Canning Operations on Ascorbic Acid, Thiamine, Riboflavin, and Niacin Contents of Vegetables, *Industrial and Engineering Chemistry*, vol. 39, 985-990, 1947.
2b. F. C. Lamb, Anne Pressley and T. Zuck, Nutritive Value of Canned Foods. XXI.—Retention of Nutrients During Commercial Production of Various Canned Fruits and Vegetables, *Food Research*, vol. 12.
2c. N. B. Guerrant, M. G. Vavich, O. B. Fardig, R. A. Dutcher and R. M. Stern, The Nutritive Value of Canned Foods—Changes in the Vitamin Content of Foods During Canning, *Journal of Nutrition*, vol. 32, 435-457, 1946.
3a. D. J. Wessel and H. A. Benjamin, Process Control of Heat Resistant Spoilage Organisms in Tomato Juice, *Fruit Products Journal*, vol. 20, no. 6, 178-180, 1941.
3b. P. Sognefest and J. M. Jackson, Pre-Sterilization of Canned Tomato Juice,

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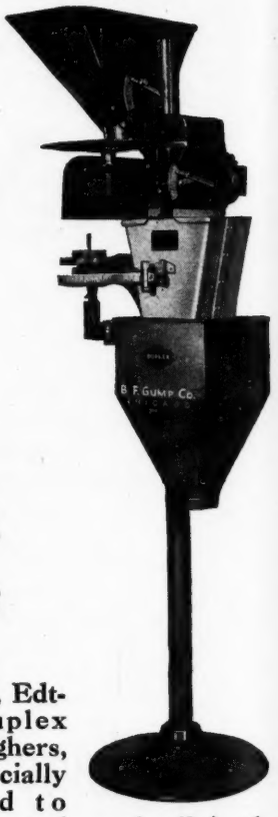

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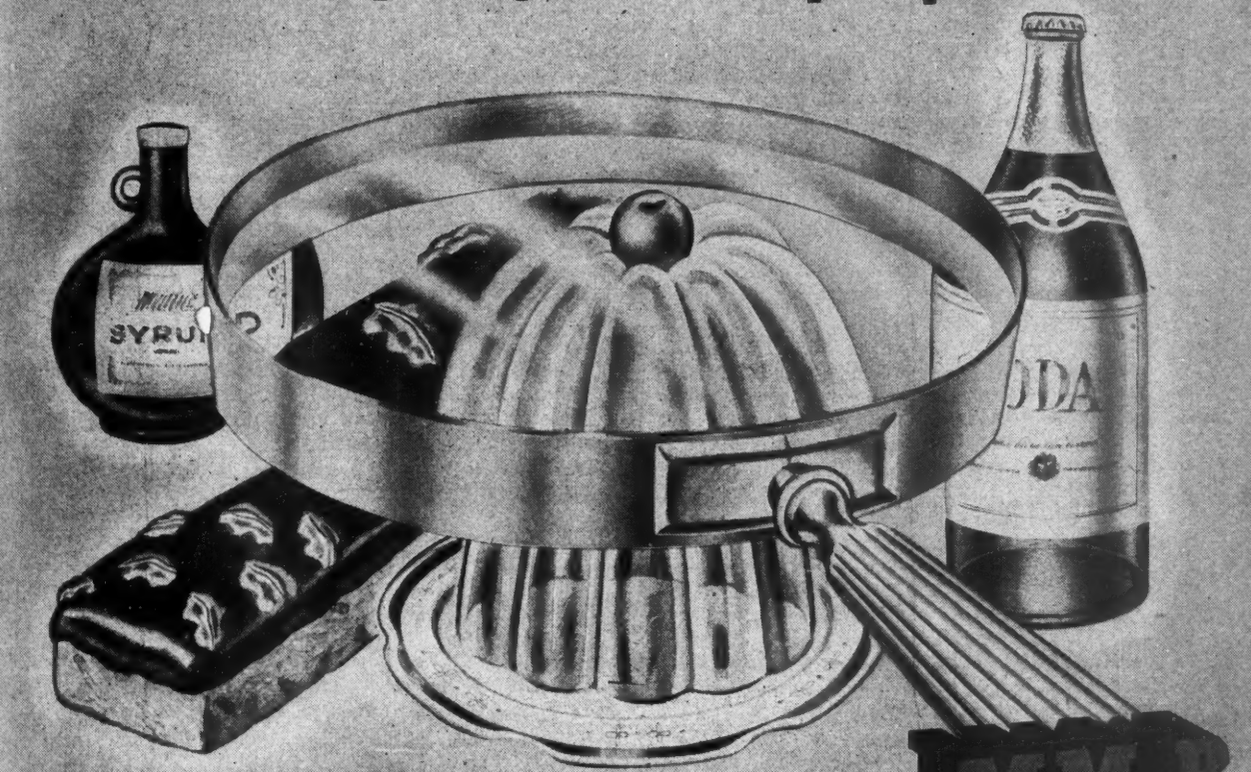

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Food Technology, vol. 1, 78-84, 1947.
4. C. O. Ball, U. S. Patent No. 2,029,303, Apparatus for and Method of Canning, Issued February 4, 1936.
5. H. L. Roberts and P. Sognefest, Agitating Processes for Quality Improvement in Vacuum Packed Vegetable, *Supplement to Information Letter, National Canners Association, Corn Technology Section*, no. 1200, 109-113, 1947.
6. C. O. Ball, Advancement in Sterilization Methods for Canned Foods, *Food Research*, vol. 3, 13-55, 1938.
7. R. H. Lueck, Recent Advances in the Technology of Canning and Can Making, *Sheet Metal Industries*, vol. 13, 1243-1246, 1345-1347, 1939.
8. D. A. Greenwood, H. R. Kraybill, J. F. Feaster and J. M. Jackson, Vitamin Retention in Processed Meat—Effect of Thermal Processing, *Industrial and Engineering Chemistry*, vol. 36, 922-927, 1944.
9. J. F. Feaster, J. M. Jackson, D. A. Greenwood and H. R. Kraybill, Vitamin Retention in Processed Meat—Effect of Storage, *Industrial and Engineering Chemistry*, vol. 38, 87-90, 1946.
10. C. O. Ball, Mathematical Solution of Problems in Thermal Processing of Canned Food, University of California Publications in Public Health, vol. 1, 15-254, 1928.
11. R. W. Pilcher and B. S. Clark, Current Trends in Nutrition Research in Canned Foods, *American Journal of Public Health*, vol. 37, 702-708, 1947.
12. United States Pharmacopœia, 12th Revision, First Bound Supplement, p. 82, 1943.
13. E. E. Snell and L. D. Wright, A. Microbiological Method for the Determination of Nicotinic Acid, *Journal of Biological Chemistry*, vol. 139, 625, 1941.
14. W. A. Krehl, F. M. Strong and C. A. Elvehjem, Determination of Nicotinic Acid, *Industrial and Engineering Chemistry, Analytical Edition*, vol. 15, 471, 1943.

—End—

Bone Darkening

(*Continued from page* 120)

one year there was a detectable loss of characteristic aroma and flavor. After eight years of storage, the chicken flavor had disappeared and the cooked chicken might have been taken for some other kind of meat.

Summary

Darkening of the bone and adjacent flesh of certain cuts of frozen chickens is common and affects the appearance of the product. It is caused by bloody marrow leaching through the bone during freezing, thawing and cooking. It does not affect the aroma, flavor or texture of chickens and it is not associated with bacterial spoilage.

Bone darkening is confined to young chickens before the bones are calcified, and is not noticeable in mature chickens. It is worse in the knee joint and occurs slightly in the back and first joint of the wing. The white meat is unaffected.

Poor bleeding of chickens causes clots of blood in the large veins, but is distinct from discoloration caused by leaching of blood through the bones. The time of chilling dressed chickens before they are frozen has little or no effect upon bone darkening. Blanching cut-up

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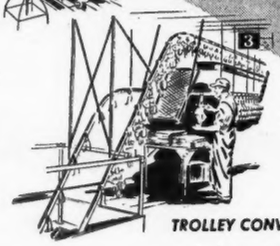

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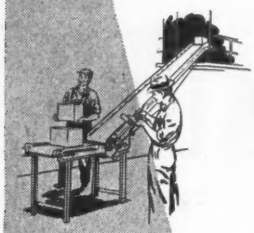

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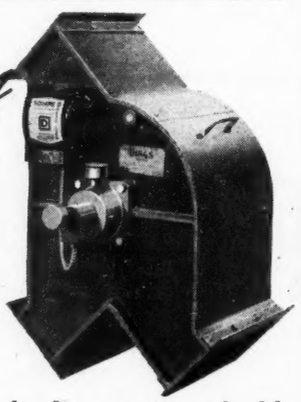

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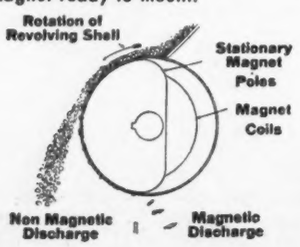

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chicken before freezing prevents bone darkening, but adversely affects the flavor of the chickens. Bone darkening increases slightly during the first few weeks in storage at 0 deg. F., and then remains constant for several years. Storing at temperatures of 10 deg. F. or higher accentuates discoloration, while storing at –15 deg. F. or lower prevents it almost entirely.

References

1. Koonz, C. H., Poultry and Eggs, Refrig. Eng. Data Book, p. 59, 1946.
2. Stewart, G. F., Hansen, H. L., Lowe, B., and Austin, J. J., Effect of Ageing, Freezing Rate, and Storage Period on Palatability of Broilers, *Food Res.* 10 : 16-27, 1945.
3. Dukes, H. H., The Physiology of Domestic Animals, Comstock Publishing Co., Inc., New York, 1942.
4. Kempster, H. L., and Henderson, E. W., Normal Growth of Domestic Animals, Mo. Agr. Exp. Sta. Res. Bul. 62.
5. Mitchell, H. H., Card, L. E., and Hamilton, T. S., A Technical Study of the Growth of White Leghorn Chickens, Ill. Agr. Exp. Sta. Bul. 367, 1931.
6. Lansing, A. I., *Biol. Bul.*, 82 : 35, 1942.
7. Lansing, A. I., Calcium and Growth in Aging and Cancer, *Science*, 106 : 187-188, 1947.

—End—

New Desiccant

(Continued from page 87)

sence of data regarding relative volume of desiccant as compared with food content, reference is made to the administration's prohibition under Section 403-D against deceptive filling. Thus, the weight of the desiccant must not be included as part of the net weight of the food in the container.

Moisture Barrier Necessary

When the desiccant is placed in cases containing a number of individual cartons of food or packages of candy, some sort of moisture barrier must be used. The kind and type of barrier will depend upon the relative value of the contents, the difficulty of maintaining the contents in dry condition, and to some extent upon the possibility of re-using the container.

One candy manufacturer uses a 30-lb. aluminum foil kraft laminated liner formed to fit the carton. It is comparatively expensive but provides adequate protection to the packages of hard candies. Carton and liner are returned to the manufacturer—possible since the company has distribution in the Los Angeles area only.

Other liners, less expensive but comparatively less effective as moisture barriers, are coated papers of all kinds—asphalt laminated kraft papers and paraffined wrappings, for instance.

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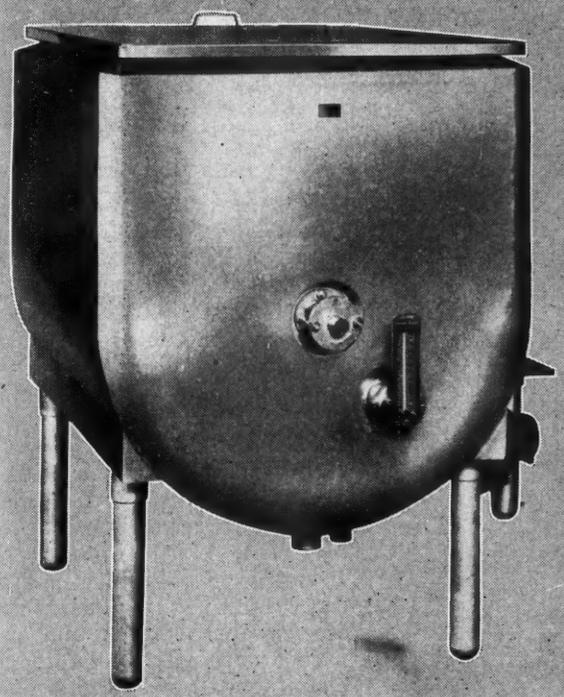

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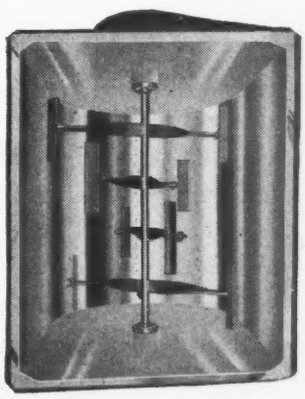

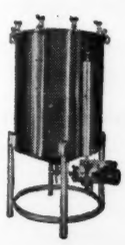

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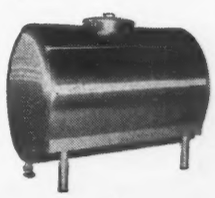

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iccant to advantage are already packaged in wrappings affording sufficient moisture barrier for economical use of an absorbent. But any manufacturer contemplating the use of a desiccant to preserve, protect or enhance the quality of his product must study the type of individual container to use, the nature of the shipping carton, and the cost of using a desiccant versus the assurance that it affords quality retention of his product.

Aids Dehydration

In the dehydration of some products, the moisture content can be reduced only to certain levels before the food becomes scorched or burned. Desiccite has been used for decreasing the moisture content of some of these foods to a lower point at which their keeping characteristics are better. It has been included in sealed 55-gal. steel drums with tomato and onion flakes and powder and with potato granules, where it reduced the moisture content of the food from 10 percent when packed to 5 percent in 30 days' time. In mixed condiments such as concentrated carrots and parsley packed in 55-gal. drums, for use in manufacture of vitamin tablets, moisture content was reduced from 5 percent to less than 3 percent in a two-week period, and to 2.5 percent in four weeks. This "in-container dehydration" while the product is in storage is accomplished without loss of quality, overheating or burning of the food.

Filtrol Corp., producer of Desiccite, is engaged solely in the manufacture of the bulk desiccant and supplies it to the packaging trade. The company has general offices in Los Angeles with plants in Vernon, Calif., and Jackson, Miss.

—End—

Research in Denmark

(*Continued from page* 72)

tion, and then afterwards they will do things the way they used to.

Movie on Fisheries Produced

I think that by using a different approach one may quite frequently get more satisfactory results. Once, for instance, we attempted to teach the fishermen in a certain part of Denmark to use more ice when handling fresh fish. Now, if we had just told them, they would probably have said that we did not know enough about it and that it could not be done. So we made a motion picture which was supposed merely

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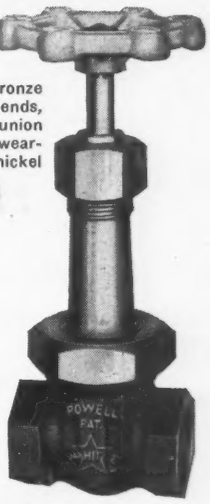

Fig. 375 — 200-pound Bronze Gate Valve with screwed ends, inside screw rising stem, union bonnet and renewable, wear-resisting "Powellium" nickel bronze disc.

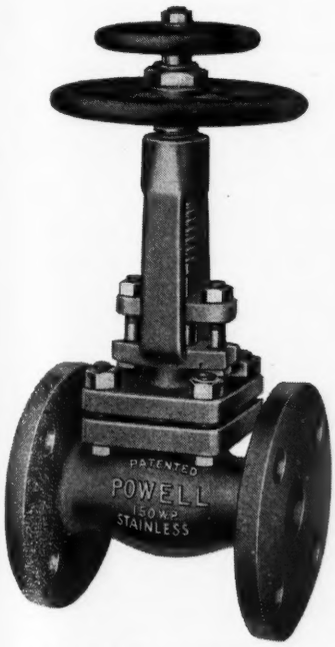

Fig. 1979 S. W.—150-pound Stainless Steel Globe Valve. Flanged ends, bolted flanged yoke-bonnet and outside screw stem. Equipped with Powell Patented Seat Wiper.

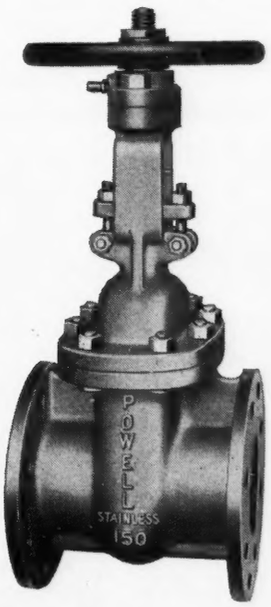

Fig. 2453-G—New, standard 150-pound Stainless Steel Gate Valve with outside screw rising stem, bolted flanged yoke-bonnet and taper wedge solid disc.

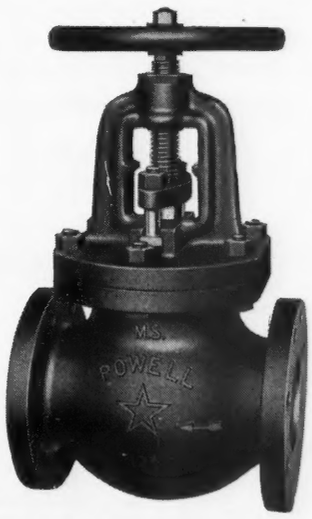

Fig. 301—Large 125-pound Iron Body Bronze Mounted Globe Valve with outside screw rising stem, bolted flanged yoke, renewable bronze seat ring with guide and renewable composition disc.

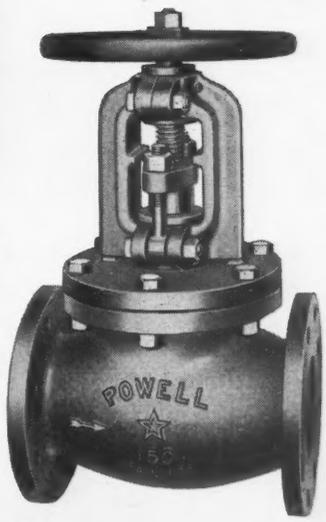

Fig. 2429—150-pound Stainless Steel Globe Valve with flanged ends, outside screw rising stem, bolted flanged yoke and taper wedge solid disc.

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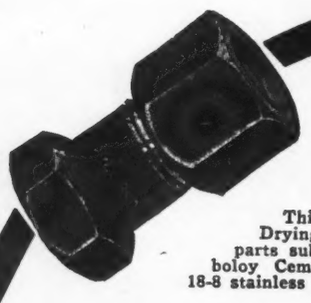

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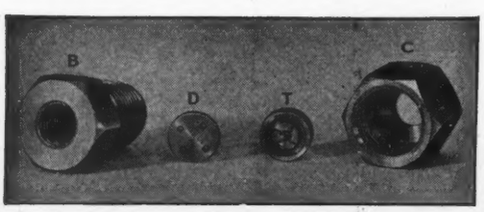

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to give a general description of the old fishing industry for which that part of Denmark is quite famous. But in doing this the film also repeatedly showed how the fishermen were always trying to improve their ways of handling the fish and were active in introducing new methods in handling the catch and also in smoking, etc. In the film it was shown how these new methods were used in different plants. The film did not show, however, that sometimes it was very difficult to find any plants where such new methods were used, if only to such an extent that they could be filmed. But in this way we managed to praise the fishermen for their foresightedness and readiness to use new technical improvements. Thus the industry did not feel insulted when new methods were suggested; on the contrary, some even felt rather flattered by our praise. The reaction of others was that if some could use these new methods and get publicity for it they would, too. And so they did, which was exactly the purpose.

I know that a great many scientists will say that the obligation of science is to get scientific results and publish them and that it is up to industry itself to utilize these results. And that is, of course, correct. But one should realize that the purpose of many research institutions is to bring scientific improvements into use. And if one has that obligation, one's responsibility does not stop until the methods are really used. Then it appears to me that one has to use whichever method is the best to obtain this result. And if this is done with a certain amount of care and tact one may discover that industry is, for the most part, extremely willing to accept the scientist and his results, and grateful for the help given. This will result in a close collaboration between science and industry, which must be the real aim of all technical research work.

—End—

Food—Home and Abroad

(*Continued from page* 93)

gram is expected to yield 65,000,000 bu. The distillers are expected to yield 12,000,000 bu. and the brewers 3,000,000. Economies in the armed services and the observance of meatless Tuesday and eggless Thursday should bring another 2,000,000 bu. This adds up to 82,000,000 bu. Other programs, such

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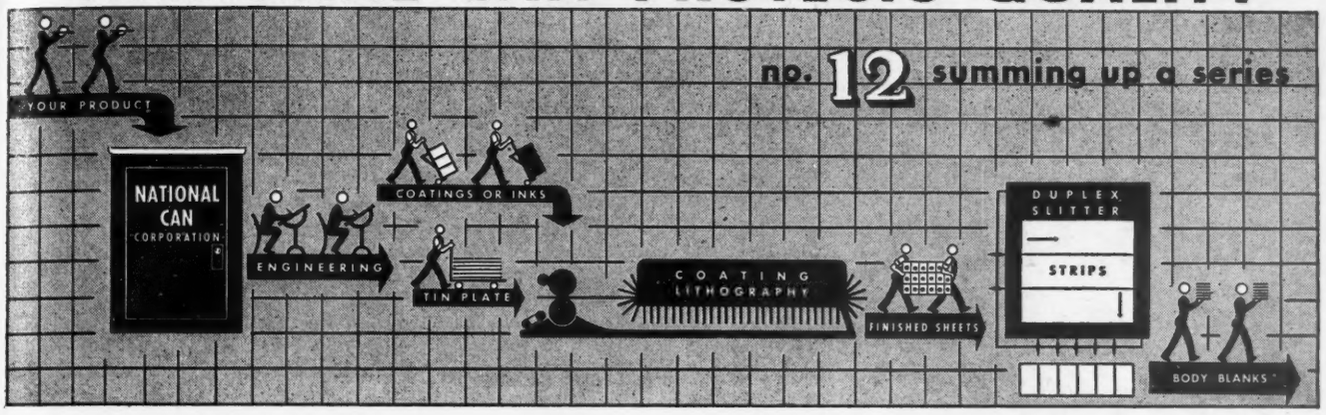

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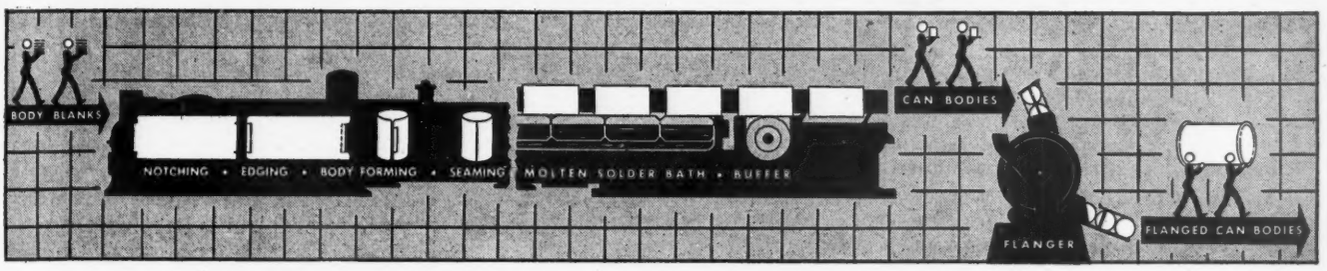

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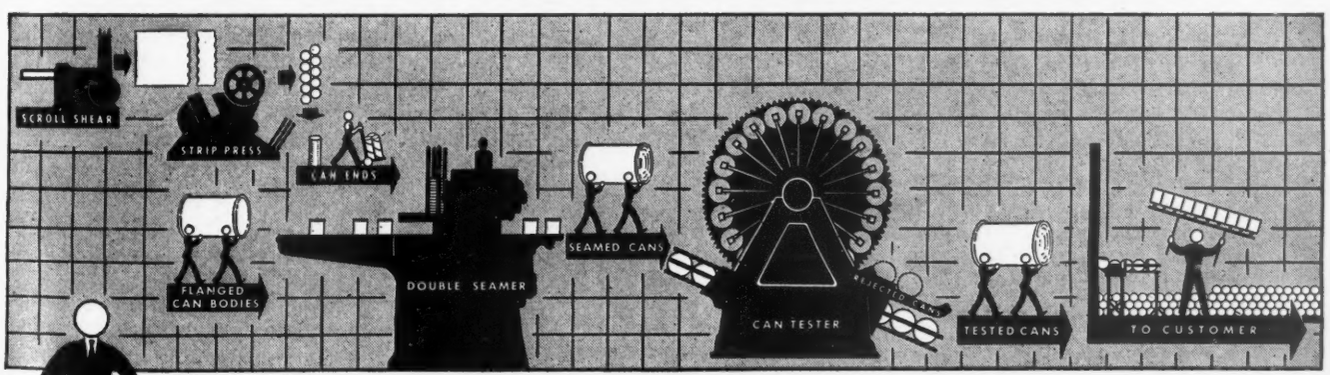

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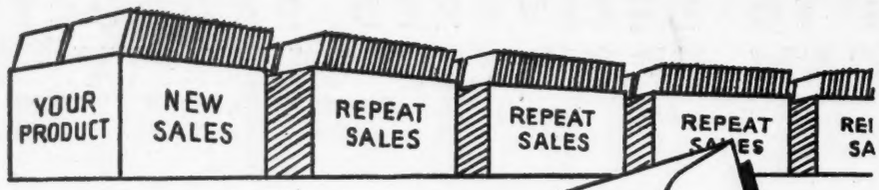

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as the "Food of the Week" plan, are expected to yield the balance. Mr. Belding stressed the point that all the programs are voluntary. The committee is confident, he said, that its aims can be accomplished on a basis of willing cooperation on the part of both the food industry and the 140,000,000 U. S. consumers.

No Charity

We should not consider aid to Europe as a charity or as a good will offering, in the opinion of W. L. Davidson, one of 22 Iowa farmers who recently investigated the food situation abroad. He declared that the future prosperity of this country depends on foreign trade and on the economic stability of the rest of the world. He described the food rations in the British Isles and conditions in the American and British occupied zones of Germany. There can be no doubt of the shortages of food, clothing and fuel, he observed, and people who lack these bare essentials are ready to turn to any leader who will give them a glimmer of hope. "The immediate problem is keeping the people of Europe from freezing and starving this winter. Our future problem is the economic stabilization of this area."

Harold E. Stassen, former governor of Minnesota, urged members of the food industry to give the government all the advice possible on food problems. It is only in this way, he said, that serious mistakes in food policy can be avoided. There is not time enough to indulge in postmortems over past mistakes in the government's program. We should support the President's plan to save food, seek its constructive modification, but support it nonetheless. The former governor also urged the full use of food products in surplus supply, particularly those not adaptable to shipping. "The wastes," he said, "that have occurred in citrus, potatoes and eggs are tragic and must not be repeated."

U. S. Stability

Speaking on the same general theme of world aid, Gardner Cowles, president and editor of Look, warned that our immediate problem was how to help western Europe get its production started quickly without exporting such a vast quantity of goods as to cause a disastrous upward spiraling of prices in the U. S. "Continued stability in the American economy," he said, "is just as important to world peace as speed in restoring

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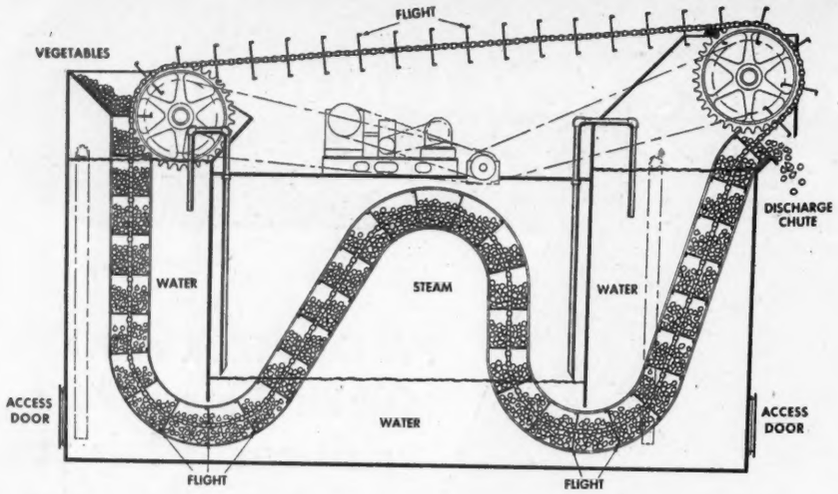

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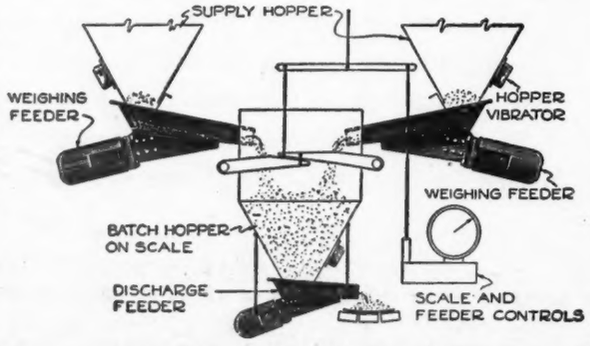

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production in Europe." The leaders of the great American food industry have, in Mr. Cowles opinion, a greater stake in seeing that the Marshall plan is sound than does any other group in the country. Nearly half of the plan's exports consists of food. Unless this tonnage of food is available, there is not much hope for the rest of the Marshall Plan. He thought that few people realize that despite a world population increase of 200,000,000, since prewar days, world wide food production for next year is estimated at 7 percent less. The Marshall Plan, in its present size, he said, means less bread and less meat on American tables for a long time to come. The world food crisis is not temporary. Those who have studied it think the export demands on the U. S. probably will be severe through 1952.

Mr. Cowles added, however, that in our position, a wisely conceived and executed Marshall Plan would make sense even if the Russian threat did not exist. Helping to restore western Europe is humanitarian, it is good business for long term trade reasons, and it helps to preserve western culture.

Worker Relations

Warning that the growing trend of government-regulated business in Europe cannot be ignored in this country, Thomas R. Reid, vice-president in charge of human relations, McCormick & Co., offered a course for American business to follow:

1. We must resell to American workers the fact that the American free enterprise system has brought our people here the highest standard of living in the world. 2. Management must accept human relations responsibilities . . . and develop a new recognition of the obligations we owe, as businessmen, to our employees, our communities, our customers, our nation. 3. We must put our houses in order by developing a new kind of human relations thinking . . . to be sure we follow through in our dealings with people as successfully as we have in developing the world's finest production in merchandising technics. 4. Finally, having done these things, we must tell people about them. Our interest in human relations should be reflected in the things we do, but emphasized in the things we say and write, to make clear to employees and public that we have their interest at heart.

The 13th annual GMA Scientific Award was presented to Dr. Wil-

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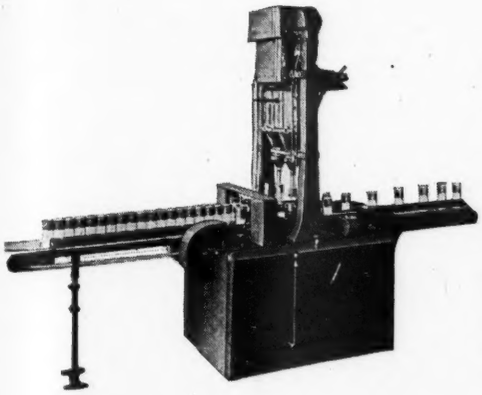

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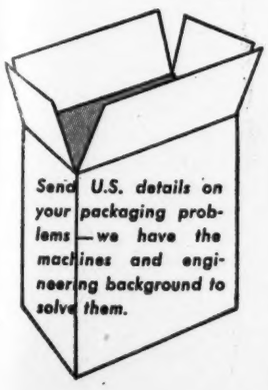

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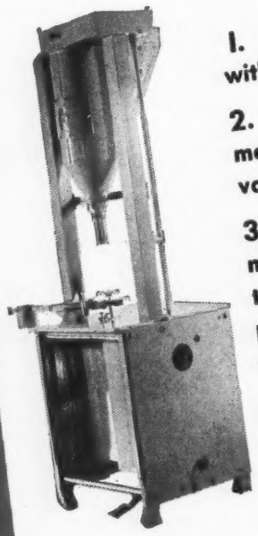

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liam C. Rose, professor of biochemistry, University of Illinois, for his fundamental contributions to the science of nutrition, particularly his studies of essential amino acids, and the discovery, isolation and chemical identification of threonine.

—End—

Cracker Quality

(*Continued from page* 102)

5. Greenberg, David M. Advances in Protein Chemistry, 1944. Edited by M. L. Anson and J. T. Edsall.
6. Johnson, H. and Bailey, C. H. A Physico-chemical Study of Cracker Dough Fermentation, *Cereal Chem.*, 1:327-410. 1924.
7. Vaupel, E. A. and Hanks, William. pH Variations in Soda Crackers and Their Control with Diammonium Phosphate, *Cereal Chem.*, 21: 16-27, 1944.
8. Salle, A. J. Fundamental Principles of Bacteriology, 1943.
9. Warburg, O. Ueber die Katalytishen Wirkungen der Lebendigen Substanz., 1928. Rev. in Respiratory Enzymes by C. A. Elvehjem and P. W. Wilson.
10. Barron, E. S. Guzman Enzymes and Their Role in Wheat Technology. Edited by J. A. Anderson, *AACC Mon.*, 1: 175-214, 1946.
11. Sullivan, Betty. Enzymes and Their Role in Wheat Technology. Edited by J. A. Anderson, *AACC Mon.*, 1:215-230, 1946.
12. Knudsen, Kgl. Vet. Landbohojskole, Rev. in Microbiology of Foods by Tanner, 1924.
13. Jago, W. and Jago, W. C. The Technology of Bread Making, 1925.
14. Seliber, Bychkovskaia and Volfson, State Inst. Expt. Agron. Bur. Agri. Mikrobiol. Bull., U.U.S.R., 259-275, 1933.
15. Nikolaev. Rev. in *Biol. Abs.*, 9, 387-1815, 1935.
16. Jones, J. A. J. Jobs for the Wounded. *Food Industries*, 17: 1318-1319, 1945.

—End—

Plant Cleaning

(*Continued from page* 76)

wash the floor and gutters to get the debris out of the plant.

3. When all gross waste has been removed determine what areas need additional cleaning to remove slime or other deposits. Do this by visual inspection or by feeling the surface. If they are slick, more cleaning is needed.
4. The slime or deposits may be removed by using detergents, high pressure equipment, brushes or other methods to be discussed later.
   If detergents are used they should be thoroughly washed from equipment surfaces before they are permitted to dry.
5. When the slime has been removed and the equipment is physically and chemically clean, apply a bactericidal agent to surfaces which the survey indicated needed such treatment.
6. After cleaning is complete, wash all equipment with water to remove any detergent or germicidal agents which may have been left.